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THE MIND AND THE MAN-WITHIN

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While those psychologists who call themselves behavior-
ists may consistently refuse to enter controversies about the
nature of mind or consciousness, yet if their methods are
adopted, it is necessary to show why the distinction between
mental and physical has such prominence in the methodology
and the fundamental assumptions underlying traditional
psychology.   In other words if, as would be maintained by a
monistic behaviorist, a psychosis is only another form of
neurosis, how did the conception "Every psychosis has a
neurosis" ever originate among so many able and critical
thinkers.

If the basis of all experience is action, then what is the
nature of those actions to which men for two thousand years
have given the name soul, ego, spirit, self, mind, conscious-
ness, ideas, volition, awareness, etc.   Is there such a thing
as a dualistic prepossession and if so how did it originate?
It seems reasonable to suppose that so thorough going a
differentiation between the mental and the physical, should
have a structural or functional basis in the human body.
Such a basis the writer believes exists in the fact that *the
nervous system of man is not supplied with sense organs or
receptors for which the adequate stimulus is either a nervous
impulse, or the neural changes induced in the nervous elements by
the passage of a nervous excitation.*   This makes it impossible
for man to react as discriminatively to neural changes in the
brain, spinal cord and nerve centers, as to changes in his
environment; that is to say, man knows more about what is

going on outside of his body than within it. Therefore, in order to meet the practical requirements of adjustment to other persons, he personifies his own behavior mechanism.

However, before it is possible to show how this structural or anatomical limitation gave rise to the mind-body problem as found in traditional psychology, it is necessary to consider the behavioristic basis underlying the concepts of the natural and supernatural.

Origin of the Natural-supernatural Prepossession.—This prepossession, the writer believes, can be traced to the fact that *when an organism is acted upon by a variety of intense stimuli for which there is no adequate inherited or acquired behavior, the organism reacts in the manner that is appropriate in the most similar familiar situation.*

For a concrete illustration imagine a primitive man caught in a terrific storm.[1] The stimuli acting on him are so intense and varied that no one course of action is long continued. The blinding flashes of lightning, the crashing of trees, the howling of the wind,—for none of these does he have a specialized response. An event for which there is a more or less adequate form of behavior, and which resembles the storm conditions, is perhaps the occasion when primitive man expects to be overwhelmed by a powerful enemy. He cannot, however, fight the storm as he would his enemies because of the non-localizable character of the storm stimuli. Since the storm offers nothing to attack, he begs for mercy. The act of begging for mercy is the appropriate reaction when fighting the enemy is no longer possible.

However, in the case of the storm there is no person or group of persons toward whom he can direct his supplication. Primitive man is apparently begging for mercy even though the usual stimulus (enemy) is absent. In other words, he is reacting to a physical event as if it were a person; he has

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[1] Some readers will wonder why the writer did not use the phenomena of death or dreams as illustrative material. In some respects these phenomena show the personifying process better than the storm situation that has been selected. The writer believes, however, that the dualism arising out of death or dreams represents a more advanced stage in the process of personification and should be regarded as corroborating rather than initiating the process.

personified the storm. It is not necessary to assume that this is the only form of behavior that could develop. Many other ways of reacting to the storm situation probably did develop, but personifying the storm has such decided advantages over other forms of behavior that it gradually displaced them. The process of personification may be regarded as developing through two stages:

1. When there is no adequate reaction to an impelling situation (storms, etc.) primitive man reacts in a manner that is appropriate (begging for mercy, etc.) in a more familiar situation (victorious enemy).

2. There is a gradual modification of the vicarious form of behavior so developed, into appropriate reactions to imaginary persons having attributes similar to the natural events so personified. Thus the storm god becomes a blustery, noisy individual. The god of winter is cold and cruel.

This process of personifying impelling natural events is to be regarded as a gradual evolution out of which the personifying reactions survive. It is not necessary to suppose that these reactions are the initial forms of behavior. When, however, a personifying reaction once occurs it soon displaces other forms of behavior because of the following advantages:

1. The individual reacts in the most resourceful manner consistent with his native and acquired endowments, because reactions to persons represent the most complex adjustments that primitive man must make.

2. The individual is given a definite plan according to which an analysis of the perplexing situation is immediately possible.

While the analysis of the storm into its apparent moods, passions, idiosyncrasies, does not at first seem valuable, yet when the alternatives are either doing this or giving way to baffled inaction, it is easy to see how an anthropomorphic analysis may lead to reactions that further effective adjustment. A simple rule for the guidance of primitive behavior might read as follows: When in doubt as to what to do, react to the situation as if it were a person; this will not only tell you what to do, but you will also be able to separate the situation into its important and unimportant parts.

It is well to point out here that this rule is only an un-verified theory; a theory that gets its almost universal validity solely from the fact that it 'works.' The theory really has no factual foundation in the sense that the hidden-man is actually ever perceived. This logical inconsistency probably had · very little effect in retarding its acceptance. It was the *practical* results that determined its adoption. '

It should not seem strange that a theory which actually has no factual basis should be adopted so generally. As social interaction becomes more complex many of the individual's reactions are directed to *absent* persons such as friends, ene-mies at a distance, chiefs or sovereigns who are actually seldom seen. It is therefore relatively easy to build up a set of adjustments to persons that are never seen or rather that are continually absent. Since the situations out of which the react-to-the-hidden-man theory arose were usually impelling or critical, the wishes and desires of the hidden-man as mediated through priests or medicine men carried with them the stamp of authority. The imperative character of the reactions to the hidden-man, their degree of permanence and constancy, the fact that the hidden-man was actually never perceived, were so different from the ordinary social reactions to other persons, or the food and shelter activities of ordinary life, that the distinction between natural and supernatural was finally made.

The Hidden-Man Theory is Displaced by Natural Science.— Even though the react-to-the-hidden-man theory could not be verified by observation, it was nevertheless effective in initiating the analysis of critical situations. This resulted in discriminative reactions which separated the essential from the non-essential. Gradually its range of application was extended to include not only critical and impelling situations but all the conditions under which man lived. Out of this, some system of religion gradually arose. While the hidden-man was never located, yet in hunting for him society learned many new ways of overcoming the hardships of nature. So valuable did some of these discriminations prove to be that some of the investigators of the attributes of the hidden-man

forgot the object of their search. It was found that many interesting and valuable forms of behavior could be developed without the hidden-man theory; indeed, in some instances the theory was even a hindrance. In this way the hidden-man theory became the instrument of its own elimination.

Finer and finer analyses were made and a methodology gradually arose in which the hidden-man theory was discarded and the emphasis placed on the classification and systematization of the discriminations that could actually be made with the sense organs. Then, instruments were devised by which the range and acuity of the sense organs were greatly increased. Formulæ and propositions were invented by the aid of which many discriminations could be predicted. Much of this now makes up what we call the body of natural science. In other words, as science develops, the gods disappear and they disappear first from those events in which the discriminations are most easily made.

There was at first considerable opposition from those in authority against discarding the hidden-man theory; indeed it is still the prevailing theory underlying human behavior, but by judiciously accepting the hidden-man theory at such times when it does not interfere with his investigations, the scientist is now left unmolested.

The Hidden-Man becomes the Man-within.—Where the nature of the investigation is such that the discriminations are not so dependent on the range and acuity of the senses, where the subject matter is hidden or obscure, or where it is dependent on records compiled by others as in the social sciences and psychology, the hidden-man theory is not so easily eliminated. A significant modification does however take place. The hidden-man becomes the man-within. The same principles that produced the hidden-man theory also produced the man-within theory of human behavior or conduct.

When man attempts to study human behavior in the same way that the geologist studies the earth, he immediately finds that one great section of his investigation is beyond the reach of his sense organs. He may discriminate to the finest detail

the nature of the stimulus; he may measure the reaction to the last degree of precision, but he cannot trace out the *path* of the nervous excitation over the nervous system which alone determines what the character of the reaction will be. The psychologist's inability to react to changes that take place in the nervous system of man is a problem of the same sort as that which confronted primitive man when he tried to react to the strange and mysterious forces of the storm. Primitive man solved his problem by personifying natural phenomena. The early student of human behavior solved his problem by personifying neural function.

For the early psychologist the man-within who directed the distribution of the nervous impulses was called the soul or ego. But the closest anatomical scrutiny failed to reveal either the soul or its administrative headquarters. It was therefore concluded by some that the soul or the man-within did not live in the body but merely escorted the nervous impulses, without influencing their distribution. By others it was concluded that while the soul did influence the distribution of the nervous impulses, it was impossible to say how it was done. A perplexing situation arose. Some psychologists invented new terms to take the place of the word soul. Some of these terms are volition, conative tendency, psychic force, vital impulsion, will to live, cosmic urge, subconscious, censor, libido, etc. Others decided that while there was not a really truly man-within, there was something else that functioned in the same way. This substitute for the man-within they called awareness, consciousness, mind, experience, meaning, intellect, mental function, satisfaction and annoyance, '*unanschaulichen Bewusstseinsinhalt.*'

Even this late modification of the man-within theory was of little help to those psychologists who were primarily concerned with human conduct. No explanation or description of the precise manner in which mind or consciousness or mental function influenced behavior was offered. The insistent demands proved annoying and to escape it some psychologists lost interest in human behavior and devoted themselves to a study of mind or 'consciousness as such.'

A new group of psychologists arose who decided to throw out the hidden-man and the man-within theories altogether. These psychologists maintain that if the nervous system, while in function, could be scrutinized as closely as the events occurring outside man's body, the need for a soul, or mind or consciousness, would be no more necessary than the hidden-man theory is necessary to account for the storm. Just as the hidden-man theory arose from the inadequate discrimination of the elements which made up natural events, so the man-within theory or the mind-body problem arose because man has no sense organs located in the nervous system by means of which the most important element in behavior, the nervous impulse, can be scrutinized and localized. That condition which is called awareness and which has always been surrounded by a halo of mystery, merely indicates that neural activity may take place and yet the individual may not be able to detect any bodily movements, or react discriminatively to the neural activity. That is to say, awareness means only that there is no detectable overt action, but nevertheless there is neural function which, if it could be observed, would have a specific configuration. These psychologists who are often called behaviorists further believe that the study of human behavior along the lines laid down by the natural sciences will not restrict it to a few mechanical reflexes but will in time include all activity even that of the introspecting psychologist or the philosophizing philosopher.

Summary.—The origin of the dualistic prepossession in traditional psychology that expresses itself as the mind-body problem, may be regarded as arising from the tendency of man to personify events for which no adequate form of behavior has been established. To react to a perplexing and impelling situation as if it were a person, releases the most effective inherited and acquired reactions and also furnishes a plan of analysis according to which the situation may be separated into important and unimportant parts. As the progressive perfection in the instruments of analysis fail to reveal the 'hidden-man' the tendency to personify gradually disappears.

Human behavior is determined by neural function but because there are no sense organs in the nervous system for which the adequate stimulus is neural function, it is impossible to discriminate the conditions which show the relation between the environment and behavior. To overcome this limitation in the study of human behavior, traditional psychology has personified neural function. The personification has passed through successive stages, from the frankly confessed personal soul or spirit, to the more restricted use of the term ego or self and finally to the guarded use of the conceptions mind or consciousness.

LENGTH OF TIME INTERVAL IN SUCCESSIVE ASSOCIATION

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This paper presents data obtained by the use of animals in the alternation problem. Two diverging paths *R* and *L* were presented and the animals were required to learn to choose between them in the given temporal sequence of *R, L, R, L, R, L*, etc., for each day's series of trials. The mastery of such a sequence of choices involves the formation of an association between each of the two responses and a certain stimulus. Naturally the two stimuli must alternate in the given sequence. Conditions were arranged so that presumably the animal would be compelled to utilize for each choice the somatic (cutaneous, kinæsthetic, and organic) stimuli resulting from the preceding run in order to master the problem. The problem thus involves the formation of an association between two successively presented terms, each response and the sensory resultants of the preceding response. The resulting coördination may be regarded as somewhat similar to the act of walking, in which the sensations from each step constitute in part the stimulus for the succeeding step. The time allowed for eating between runs was varied for the different groups of animals. In this way the length of the interval between the two terms to be associated was varied, and our problem may be stated as the influence of the length of the time interval between two successively presented terms upon the speed of their association.

A plan of the problem box employed in the experiment is represented in Figure 1. Its dimensions are 2¾ x 5 ft., with 4 x 4 in. runways and a 10 x 13 in. food box. With the exception of the food box *A*, the apparatus was covered with a glass top. An initial runway *C* opens from the food box by the opening *B* which can be closed by a sliding door. At

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the end of this runway are two diverging paths R and L which finally merge into a common path D which in turn leads to the food box by the door E.   These return paths to the food can be blocked as desired by the sliding doors X and Y.
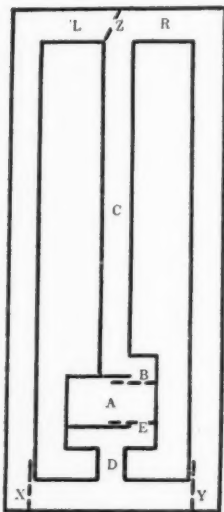

FIGURE 1.   Problem Box.

The rats were required to master the habit of alternating their choices between the two diverging paths in the definite sequence of R, L, R, L, R, L, etc., for each day's series of trials. The animal was placed in the food box and forced through the door B which was then closed.   In the first trial of each day's series of runs, the doors X and Y were arranged so that food could be obtained only by means of path R. In the succeeding trial the doors were rearranged so that path L was open and R closed.   Between the successive runs for a day's series, the rats were allowed to eat for a definite time interval. This interval was measured by means of a metronome adjusted to ring a bell every five seconds.   The progress of the animals in mastering the association was measured by the percentage of successful choices in each successive 100 trials.   Naturally the initial records will approximate 50 per cent., and the values will increase to 100 per cent. as the problem is mastered.

The sensory basis of the two responses must consist of two different stimuli which alternate in the given sequence. There are several stimuli which fulfill these conditions:

1. The responses may be based upon stimuli involved in the adjustment of the doors X and Y.   This possibility was eliminated by control tests in which the adjustments were made after the animals had made their choice, or in which both doors were left open for a number of consecutive trials.   The utilization of such stimuli would not, however, invalidate any conclusions concerning the relation of the time interval

to the rate of learning. It was the general practice throughout the experiment to adjust these doors immediately after the animal had entered the food box. As a consequence the two terms to be associated would be separated by the interval of time allowed for eating between runs.

2. The animals may have been guided by two different modes of handling while being inserted through the door *B*. To avoid this possibility the manner of handling and placing the rats in the initial runway was varied during the mastery of the problem and in control tests at the termination of the experiment.

3. The rats may have responded visually to two distinctive attitudes assumed by the experimenter while they were traversing runway *C*. It was soon observed that the experimenter naturally tended to act differently as the sequence of correct choices was alternated. The experimenter attempted to inhibit this tendency and maintain a constant position and attitude for all trials until the choice had been effected. The writer attempted to influence the choices of the rats by such means in one test. The orientation of the animal in relation to the experimenter while traversing the initial runway is such that the utilization of visual stimuli from the experimenter would presumably be difficult. The possibility was effectually eliminated in one experiment by a control test in which the initial runway was entirely covered so that visual stimuli from the experimenter were excluded until after the animals had entered one of the return paths.

4. Smell is also a possibility. One may assume that the odor left from the last run is stronger than that resulting from the run preceding it. Choice would thus be based upon a difference of olfactory strength of the two trails. Mastery of the problem would involve the selection of the weaker of the two olfactory stimuli. The pathways were thoroughly washed every two or three weeks during the course of the experimentation and this procedure disturbed in no way the ability to make successful choices on the succeeding day. If olfactory stimuli were utilized, choice would presumably

be impossible until the animal had reached the point of divergence at the end of alley *C*. As a matter of fact the selection of a path in the majority of cases had been determined before this point was reached. This fact was quite evident from the behavior of the animals and the phenomenon was noted and commented upon by several observers. Before reaching the end of the initial pathway, the animals generally manifested a bodily attitude adaptive and preparatory to the turn involved in entering the selected return path. In case of a leftward turn, the animals veered over to the left side of the alley with the body twisted and curved in that direction. It was quite evident that the whole organism was being adjusted for that sort of a turn, and in the majority of cases in the later stages of the experiment the observer could easily predict the path to be selected when the animal was from one to two feet away. A few rats at certain stages in the mastery of the problem apparently did not make their choice until the two diverging paths were reached; they ran the initial path in a desultory fashion and then exhibited hesitation and wavering between the two possibilities before a final selection was made. This type of behavior was the exception however.

5. Another possibility was suggested by Mr. E. S. Robinson. The hypothesis assumes that the rat first develops a tendency to repeat the previous choice. The effect of each run is retained during the interval and the tendency is awakened by the stimulus from the apparatus when the rat is inserted into the entrance alley. Such a tendency toward repetition is involved in the formation of position habits. Under our conditions this tendency to repeat the previous act will naturally result in an error or wrong choice. The rat now learns to inhibit this wrong response and choose the opposite path. The rat starts to turn in the wrong direction and this sensory attitude becomes the stimulus to the correct choice. On this hypothesis the production and elimination of errors are necessary stages in the mastery of the problem. Furthermore the two associated factors, the correct response and the somatic stimuli involved in the

tendency to enter the wrong path, are presented in immediate succession. The behavior described in the previous section would seem to eliminate this possibility. The assumed process of gradually inhibiting the wrong act and substituting the correct response in its place was not observed. Neither did the animals when placed in the initial runway first manifest an attitude antagonistic to their subsequent choice and then reverse it. The only observable attitude was one adapted to the succeeding choice.

6. The animal may assume and maintain two distinctive orientations in the food box during the interval allowed for eating. We were unable to observe such attitudes, however. On the contrary, each rat assumed a characteristic attitude which was constant for the majority of the trials. The construction of the apparatus minimizes this possibility inasmuch as both return routes finally merge into a common path and the animals are compelled to approach the food in an identical manner irrespective of which return route was chosen.

7. The remaining factor is the somatic sensitivity involved in the preceding run. The two responses necessarily entail two distinctive sets of somatic stimuli, and each of these may well constitute the basis of the subsequent choice. The fact that choice was apparently determined by an organic set manifested while the rat was in the initial runway is readily explicable on this hypothesis. Proof of the efficacy of this factor is primarily a matter of exclusion, the elimination of all other possibilities.

1. The first experiment was conducted by a graduate student, Miss Louisa Lewis. Three groups of eight rats each were employed, but several were eliminated by various causes during the experimentation. Complete records were obtained from five rats of group *A*, three of group *B* and seven of group *C*. The time intervals for groups *A*, *B*, and *C* were 15, 25, and 35 seconds respectively. Similar conditions obtained for the three groups throughout. Twenty trials per day were given each animal with occasional exceptions when the condition of the animals did not warrant that number.

The animals were tested daily with the exception of Sunday.
The tests were omitted for a period of ten days at the end of
1,300 trials.   To facilitate the progress of the experiment,
two animals were generally tested simultaneously; one rat
was allowed to run while the other was engaged in eating
during the specified time interval.   The experiment was
continued until each rat attained a record of 90 per cent. of
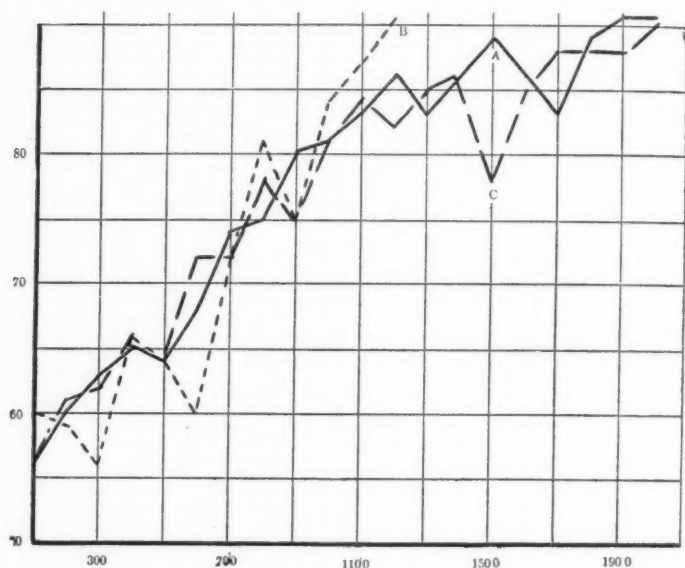correct choices for 100 trials.

FIGURE 2.   The graphs *A*, *B*, and *C* represent the average percentage of correct
choices for successive 100 trials for the intervals of 15, 25, and 35 seconds respectively.

Graphs *A*, *B* and *C* of Figure 2 represent the records of
the three groups.   The values represented are the average
number of correct choices per group for each successive 100
trials.   All animals succeeded in attaining a record of 90 per
cent. of correct choices for 100 trials.   The three groups
were subjected to the various control tests enumerated above
with the exception of that for visual cues from the experi-
menter while traversing the initial path.

Several significant features of the results deserve comment: (1) All curves start slightly above the 50 per cent. level. The animals make some progress toward a mastery of the problem during the initial 100 trials. (2) Curves *A* and *C* exhibit no significant differences. The rate of learning is the same for the two intervals of 15 and 35 seconds. (3) All three curves are practically identical for the initial 1,000 trials. Evidently the rate of progress for the initial stages of learning does not depend upon the time intervals employed. (4) Curve *B* rises quite rapidly from the 1000th to the 1200th trial. This fact is the only evidence that the rate of learning may be a function of the length of interval. Other modes of explanation are possible. Unfortunately this group contained but three rats at the end of the experiment. The progress of any animal in this problem is highly erratic; a high record may be made consistently for a number of days, and this period may be followed by one in which extremely poor records are achieved. This sudden rise of the curve may be a chance spurt and the group might have been unable to maintain this level of excellence if the tests had been continued. The experiment should have been continued. Chance might still be a factor even if the group had been able to duplicate their records in succeeding trials. Individual success in such a problem is quite dependent upon chance factors. The experiment can hardly be regarded as a decisive test of the influence of the time interval upon the rate of learning. The evidence favors the assumption that the differences employed in the experiment were without effect.

2. A second experiment was conducted by the writer. Groups *A*, *B*, and *C*, each containing 6 rats, were tested for intervals of 5, 10 and 15 seconds respectively. Several conditions differed from those of the preceding experiment. The animals had had previous experience in a maze problem. Ten trials per day were given each animal for seven days of the week. But one rat was tested at a time. Owing to sickness no tests were given for a week at the end of the 900th trial. All control tests previously enumerated were given at the end of the experiment.

The group records are represented by the graphs of Figure 3. Again the initial values are greater than 50 per cent. From an inspection of the curves it is evident that no group probably would have attained a proficiency of 90 per cent.
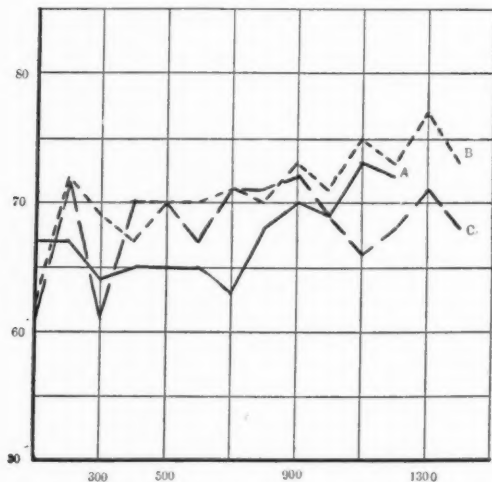

FIGURE 3. The graphs *A*, *B*, and *C* represent the average percentage of correct choices for successive 100 trials for the intervals of 5, 10 and 15 seconds respectively.

within 3,000 trials. For this reason the experiment was discontinued. However, some rats did attain this level of efficiency during the experimentation. Other animals were making progress and gave every indication of final success. Some rats soon fell into fixed position habits and gave no indication of further progress. Group *B* made the best records rather consistently. Their records are the highest in 11 of the 14 cases of comparison. Two rats of this group made scores of 90 per cent. of correct choices, while only one animal in each of the other groups attained this level of proficiency. There is but little difference between graphs *A* and *C*. Group *C* on the whole made the better initial records, while group *A* made the more rapid progress in the later stages of the experiment. As to the influence of the

time interval upon rate of mastery, the records indicate that
10 seconds may be the most favorable of the three intervals.

3. A third experiment was conducted by Miss Koch.
She tested group *A*, consisting of seven animals, for a 10-
second interval, and group *B* containing six rats for a 15-
second interval.   The conditions of the experiment were the
same as those of experiment 2 with the following exception.
By means of the swinging door *Z* (see Fig. 1), the entrances
into the paths *R* and *L* were
alternately closed and the ani-
mals were thus forced to run in
the given sequence of *R, L, R, L,*
etc., for each day's series of
trials.   But one path was open
at a time; errors were impossi-
ble; the rat was compelled to re-
spond correctly in the desired
sequence.   To obtain records of
the rat's progress in mastering
this coördination, test series were
interpolated every fifth day, in
which the door *Z* was removed
and the animals were allowed to
choose between the two paths as
in the former experiments.   The
percentage values for each 100
total trials are thus based upon
two test series of 10 trials each.

The scores for these two
groups are represented by graphs

FIGURE 4. The graphs *A* and *B*
represent the average percentage of
correct choices for successive 100
trials for the intervals of 10 and 15
seconds respectively.

A and *B* of Figure 4.   The initial records are quite high and
neither group gave much indication of further progress.
Evidently progress was confined mainly to the initial 100
trials.   Certain animals succeeded in attaining a proficiency
of 90 per cent. of correct choices.   The graphs gave so little
indication of an early group mastery that the experiment was
discontinued.   The high degree of irregularity of the succes-
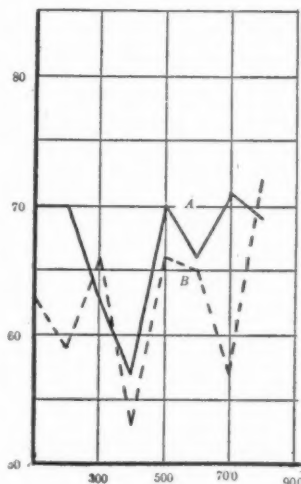sive scores is due to the small number of trials upon which

the values are based. Group *A* made the better record. Their scores were the higher in six of the eight comparisons. Three rats of this group made a record of 90 per cent. while but one rat of group *B* attained this degree of proficiency. The group difference is probably not very significant, but the results indicate that 10 seconds is a more favorable interval than 15 seconds.

The character of the curves in experiment 1 is radically different from the type of curve obtained in experiments 2 and 3. The latter curves exhibit the greater progress for the first 200 trials, and maintain a higher level for 500 trials; From this point on the curves of experiment 1 rise much more rapidly and maintain this ascendency for the remainder of the experimentation. The explanation of this difference in rate of progress must be sought in the different conditions of the experiments. Length of interval is not a factor, as the 15 second interval was employed in all three experiments. The previous experience of the animals in experiment 2 may account for the greater initial progress of these groups, but this factor can hardly explain the poor records of these animals in the final stages of the experimentation. Moreover the rats used in experiment 3 lacked previous experience. The technique of the experimenters may have been a factor. The rats employed in experiment 1 may have learned to rely upon visual cues from the experimenter in making their choices, as this possibility was not eliminated by control tests. The number of trials per day seems the more probable cause, as 20 trials per day were given each rat in experiment 1 as compared to 10 trials in experiments 2 and 3. On this hypothesis 10 trials per day is the more effective distribution for the initial stages of mastery, while greater progress can be attained by the use of 20 trials after this early period of adjustment to the problem. Such a fact will constitute an exception to our present knowledge concerning the relative values of concentrated and distributed trials. This conception must be regarded as a tentative hypothesis to be tested by further experimentation.

Our experiment proves that animals can form an associa-

tion between two terms separated by a time interval as large as 35 seconds, provided that this interval is filled in with some rather constant type of activity such as eating. There is no conclusive evidence that the rate of learning is a function of the length of time interval employed. Certainly the rate of learning does not vary directly with the length of interval. There was some indication in two experiments that 10 seconds may be more favorable than either a 5- or 15-second interval. In the first experiment the 25-second group mastered the problem more readily than did either the 15- or 35-second groups. All of these differential results may well have been due to chance factors. In the absence of any conclusive evidence to the contrary, one must assume from our data that the speed of forming the association was not dependent upon the size of the intervals used. One is not justified, however, in extending this conclusion to other intervals. One must also admit that the method of the experiment is not particularly well adapted to the solution of the problem.

This problem of the relation of the rate of learning to the time interval has received but little attention from experimenters in either the animal or human field. Bergstrom and Froeberg have made excellent studies with the use of human subjects. In Bergstrom's[1] first experiment the subjects were required to memorize a list of 12 syllables which were visually presented in succession. Each syllable of the series was exposed to view for a period of 82σ, and a given time interval was allowed to elapse between the successive exposures of the syllables. The problem thus required the association of a series of 12 terms successively exposed when the series of exposures were separated by a given time interval. Three subjects were tested. Each memorized 12 lists of syllables per day for four days. The subjects were requested to pronounce silently each syllable but once at the time of its exposure. After four repetitions of a list of syllables, the amount memorized was measured by the number of errors

[1] Bergstrom, John A., ' Effect of Changes in the Time Variables in Memorizing, together with some Discussions of the Technique of Memory Experimentation,' *Amer. J. of Psychol.*, 1907, **18**, pp. 206–238.

made in an immediate written reproduction. The intervals between exposures were 302σ, 686σ and 1454σ, and the average number of errors for the three intervals respectively were 10.3, 8.9, and 7.5. In a second test 30 subjects were used and the material consisted of lists of 10 words and lists of 10 letters. This material was presented orally at a rate controlled by the beating of a metronome. Since the time necessary to pronounce each term of a series presumably approximated a constant, the differences of rate will represent differences of time interval between successive exposures. The time intervals employed were .5, 1, and 2 seconds. Each list was presented but once and the amount memorized was tested in terms of the errors made in an immediate written reproduction. The average percentages of error for the lists of words were 51.12, 36.5, and 23.9 for the .5, 1, and 2-second intervals respectively. The corresponding percentage values for the lists of letters were 44.09, 42.65, and 38.44. In both tests the amount learned increased as the interval was lengthened, and the author indicates his belief that this relation will obtain for much larger intervals than those employed in the experiment.

Froeberg's[1] subjects memorized a series of five pairs of syllables. Each term of the pairs was exposed for about one fourth of a second. The members of the pairs were exposed in succession and the interval between their exposures was varied from 0 to 5 seconds. The interval between successive pairs was a constant. Each series was given two repetitions as a rule, and the amount memorized was tested 10 seconds later. In the test for recall the stimulus syllables were presented in a new order and the subject was required to supply the missing member of each pair. The subjects were requested to inhibit the tendency to articulate the syllables and to refrain from all thought associations. The average percentages of correct responses for the group of seven subjects were 49, 45, 48, 51, 49, and 49 for the intervals of 0, 1, 2, 3, 4, and 5 seconds respectively. These figures indicate that the

[1] Froeberg, ‘ Simultaneous versus Successive Association,’ PSYCHOL. REV., 1918, 25, pp. 156–163.

rate of learning is not a function of the length of interval. The experiment was repeated with a group of four subjects with one change of condition. Numerals were visually exposed during the interval of time between the exposures of the members of a pair which were to be associated, and the subjects were asked to perceive and read these interpolated numerals during the interval. This procedure was designed to prevent a memory survival of the first member of a pair during the interval separating it from its associated member. With these conditions the average percentages of recall for the above intervals were 45, 34, 36, 40, 24, and 22 and the rate of learning decreased with the length of interval.

There are but two experiments on this topic in the field of animal psychology. Thorndike[1] taught cats to climb up three feet on the wire netting constituting the sides of their cage in order to obtain food held in his hand. The cats had thus learned to associate the act of climbing to a given spot with the visual stimuli of food in the hands of the experimenter. Thorndike now sat at a distance of 8 feet from the cage, clapped his hands four times and said 'I must feed those cats.' After a lapse of 10 seconds, he took food, walked over to the cage and fed them as usual. This procedure was repeated in order to determine if the animals could learn to associate the act of climbing with the visual and auditory stimuli involved in the clapping of the hands and repeating the phrase. Such an association was soon formed and the cats climbed up for the food as soon as the new stimulus was given without waiting for the experimenter to bring it in the usual manner. The animals thus learned to associate two terms which were at first experienced successively with an interval of 10 seconds between them. Thorndike did not vary this interval in order to determine the relation between its length and the rate of learning. The experiment merely proves that cats under these conditions can learn to associate two terms over an interval of 10 seconds.

In a previous experiment with the alternation problem,

[1] Thorndike, ' Animal Intelligence,' p. 111.   The MacMillan Co.

the writer[1] employed an interval of 16.5 seconds, and a group
of white rats mastered the problem with a high degree of pro-
ficiency.   The length of the interval was not varied during
the learning process.   The experiment indicates again that
rats can form an association over an interval of 16.5 seconds.
The experiment was defective in that the apparatus per-
mitted the maintenance during the interval of a motor atti-
tude characteristic of the previous choice.   It was thus pos-
sible that the two choices were based in part upon the two
distinctive motor attitudes maintained during feeding.   On
this hypothesis the interval between stimulus and response
would be much less than 16.5 seconds.

There are three possible types of explanation of the fact
that association can bridge a considerable interval of time.
(1) One may assume the memory survival of each term during
the interval until the succeeding term is presented.   The
connection is thus established between two simultaneous
activities—the perception of one term and a conscious repre-
sentation of the preceding one.   (2) The connection may be
mediated by some third factor which is present during the
interval.   A series of syllables may be memorized by associ-
ating each with its position in a temporal sequence.   Almost
any kind of mental activity may serve such a mediating
function.   (3) The third possibility assumes that the two
terms may be associated directly, that each activity becomes
connected with the retained effects of the preceding activity.
An inspection of the various statements concerning association
in the texts and treatises on general psychology reveals the
fact that simultaneous or successive presentation is regarded
as an essential condition for the formation of an effective con-
nection.   The term 'immediate' is not explicitly defined.
Apparently the authors imply one of two things: The two
experiences must be in temporal contact with no interval or
interpolated activity between them, or other experiences may
intervene but the two terms to be connected must exist
within the 'specious present.'   On this basis only conscious

[1] Carr, Harvey, 'The Alternation Problem,' J. of Animal Beh., 7, pp. 365–
384.

activities can be associated, and our third possibility of connection is excluded.

Thorndike in his experiment with cats considered the first and third possibilities. He regarded a direct connection as highly improbable, and hence inferred that the association must have been mediated by a memory image of some sort. The experiment is thus presented as a proof of the existence of an ideational capacity in cats. The second possibility was ignored. Such a mediating factor may have been the visual perception of the experimenter. On this hypothesis the experience of the food became associated with the perception of the experimenter and this latter term was again associated with the hand clapping and the spoken words.

In Bergstrom's experiment memory connection was possible. Temporal association and other indirect thought connections may have been established. The character of the results indicates such modes of connection, for the longer the interval the greater is the possibility of a memory review and the development of effective thought connections.

In Froeberg's experiment temporal association was excluded by the method of paired associates. The temporal order in recall was different from that in presentation. In the first test the subjects were requested to refrain from developing thought connections and to inhibit the tendency to articulate the syllables. In spite of these instructions, the subjects reported that the association was mediated by memory. In the second test the subjects were required to read numerals during the interval. This activity was interpolated for the purpose of preventing any memory connection, and the introspective reports indicated that the procedure was successful. Froeberg thus concludes that associations can be established directly over an interval of at least 5 seconds, and that within these limits the rapidity of learning decreases with the length of interval.

There are three possible objections which can be urged against Froeberg's conclusions. (1) One may assume that all memory and thought connection was not wholly excluded. This hypothesis can not be regarded as wholly irrational as

such modes of connection are many and devious, while some
are by no means capable of being easily and readily observed.
Such an objection will apply to practically every experiment
which employs human subjects. (2) One may assume that
the associations were mediated by these interpolated ac-
tivities themselves. With this conception the subjects were
memorizing a series of terms presented in immediate succes-
sion,—a syllable, a numeral, a second numeral, and the final
syllable. Owing to the instructions for memorizing and
recall only the final term is reproduced. This explanation is
similar to that suggested for Thorndike's experiment, viz.,
that the connection may have been mediated by the visual
perception of the experimenter. (3) One may admit that the
connection between the syllables was formed directly but
deny the validity of Froeberg's factual correlation between
rate of learning and length of interval on the ground that the
interpolated activity constitutes a distraction.

It is not our purpose to maintain the validity of the
above objections. Rather we wish to emphasize the diffi-
culties involved in securing a decisive proof of the possi-
bility of a direct associative connection with the use of
human subjects, and to suggest that animal experiments offer
certain advantages for the solution of the problem. Pre-
sumably indirect thought connections can be effectively
excluded by this means. Few will assert that our animals
mastered the alternation problem by means of a concept of
temporal order, viz., that they developed an idea of the prin-
ciple of alternation and kept track of the proper response by
counting the number of trials. Neither is the employment of
other conceptual devices very likely. The experiment was
devised in order to exclude a connection by means of the
interpolated activity. The animals form two distinct associa-
tions while the interpolated activity of eating was the same in
both cases. It was assumed that one interpolated activity
could not mediate two distinct associations. Further re-
flection, however, has induced some scepticism of the truth
of this proposition.

Granted the elimination of all indirect modes of connec-

tion of the second type, one must choose in our experiment between the hypotheses of a memory survival or of a direct connection.   As noted Thorndike regarded the former explanation as the more probable.   The writer prefers the latter conception.   On the one hand the memory hypothesis encounters many factual and theoretical difficulties which need not be enumerated at this time.   Animals are preferable to human subjects in the attempt to avoid a memory connection.   A direct connection, on the other hand, seems logically feasible on the basis of certain generally accepted explanatory principles.

Let us take the problem of associating the stimulus X with a certain movement Y. Originally the stimulus X will not evoke the act Y, and the problem consists of so connecting them that Y will become the natural motor outlet of the nervous impulse aroused by X. This connection is usually secured by the simultaneous functioning of the two terms, and the experimenter achieves this result by evoking the act Y by the use of some stimulus B at the same time that stimulus X is presented. The whole task of the experimenter consists of repeating this simultaneous presentation until the connection is effected; the rest of the process must be left to nature.

A usual type of explanation assumes that the nervous impulse aroused by X is deflected from its normal channels over to the motor outlet Y because of the lowered resistance or tension in that center due to its activity.   This conception involves two assumptions: (1) The motor outlet of an incoming sensory impulse is in part a function of the relative resistance, tension, or susceptibility to response of the various motor centers.   Each sensory impulse naturally tends to be drained off into that motor channel which for the time offers the minimum of resistance. (2) The conception assumes that the resistance or tension of any center is decreased by the functional activity of that center.   The point which we wish to emphasize in this mode of explanation is the fact that the state of decreased resistance is the *essential condition* which mediates the desired connection.   The induced ac-

tivity in the motor center is not important *per se*, it is but a
means to an end. Theoretically an experimenter can es-
tablish an associative nexus between the given factors by
any device which will effect a decrease in the resistance of the
motor center.

The conception of resistance is also frequently applied to
the phenomena of retention and habit. The hypothesis
assumes that the repeated activity of a center permanently
lowers its resistance or increases its susceptibility to activity.
By sufficient practice any center may be brought into a
rather permanent state of a high degree of readiness for re-
sponse. With such a center, activity produces the maximum
of effect, and this effect rather rapidly diminishes with the
cessation of activity until the relatively permanent level of
habit is reached. On the basis of this conception, there are
no *a priori* reasons why an effective association can not be
established over a considerable interval of time, provided
that one of the factors, *e.g.*, the motor center Y, has been
developed by practice to a state of readiness much greater
than that of any other motor outlet. One should expect
that simultaneous presentation will constitute the most
favorable condition for the formation of an association but
that the rate of learning will diminish as the time is increased
up to a certain interval, after which further variations of
interval will have but little effect.

Certain writers prefer to regard a state of activity in
a center as a necessary condition of its lowered resistance or
readiness for response. When the motor center Y is evoked to
activity by the controlling stimulus A, it is assumed that this
activity will persist in a subconscious and subliminal form
after the stimulus is removed. Applying this conception to
habit, a nervous activity when once aroused never completely
subsides. A center when once active never attains a state of
functional quiescence. Association over a time interval is
as feasible on this basis as on that sketched above. The
writer sees no reason why readiness for response can not be
conditioned by a state of functional quiescence as well as
by a state of subliminal excitement. The additional hypo-

thesis is thus gratuitous. While one can easily conceive of the persistence of an activity for a short interval of time on the principle of inertia, yet the further assumption of an indefinite continuance rather taxes one's credulity.

In conclusion, this paper advances the following propositions. An associative nexus can be established over a considerable interval of time. Our results do not permit of any statement that the rate of learning is a function of the intervals employed. With the possible exception of the interpolated activity, the connection was not mediated by some third factor. As an explanation one must choose between the hypotheses of direct connection or of memory survival. The choice must be determined largely by *a priori* considerations. We do not assert the validity of the resistance conception as applied to the phenomena of habit, retention, and the formation of associations. We do note the fact that such a mode of conception is quite generally accepted, and we do maintain that on the basis of these assumptions the hypothesis of a direct connection is logically permissible. One must either admit the possibility or deny the validity of the resistance conception.

A STUDY OF ASSOCIATION IN NEGRO CHILDREN

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The question of racial differences in mental capacity has always been of interest, but data which might make possible a scientific judgment concerning it are as yet scant. It is difficult to distinguish, in the performance of subjects, the parts to be attributed, respectively, to native mental capacity and to influence of environment.

It is obvious that in work with children the environmental factors cannot be so prominent as in work with adult subjects; and the present study, having been undertaken in the hope of contributing toward an answer to the question of racial differences, was therefore carried out on young subjects.

The material consists, in the main, of three hundred association test records. The subjects were negro children found in New York City schools, in age groups of twenty-five ranging from four to fifteen years, and about equally divided as to sex. In other respects the selection of subjects was a random one.

The technique of the investigation was that of the Kent-Rosanoff test. This test, as has been shown, furnishes results which are in close correlation with mental capacity and, up to the age of eleven years, with degree of maturity, while they seem to be influenced to but a slight extent, if any, by education.[1] This test, moreover, having previously been applied to many variously selected subjects—normal adults, children of different ages, insane, and feeble-minded subjects—affords an opportunity of comparing the results obtained in our group with those of various other groups.[2]

[1] Isabel R. Rosanoff and A. J. Rosanoff, 'A Study of Association in Children,' PSYCHOL. REV., 1913, 20, 43–89.

[2] G. H. Kent and A. J. Rosanoff, 'A Study of Association in Insanity,' *Amer. J. of Insanity*, 1910, 67, 37–96, 317–390. F. C. Eastman and A. J. Rosanoff, 'Association in Feeble-Minded and Delinquent Children,' *Amer. J. of Insanity*, 1912, 69, 125–141.

In Table I. is presented in statistical form the showing made in the test by the negro children as a whole, together with figures for various other groups of subjects.

TABLE I

Subjects	Common Reactions		Doubtful Reactions %	Individual Reactions %	Failures of Reaction %
	Specific %	Non-specific %			
1,000 normal adults..........	85.5	6.2	1.5	6.8	———
247 insane adults............	66.4	4.3	2.5	26.8	———
253 defective children aged over 9 yrs.................	75.2	8.2	2.1	13.0	1.5
125 normal white children 11–15 yrs................	82.0	7.2	1.6	8.6	0.6
175 normal white children 4–10 yrs................	62.7	4.2	3.2	18.8	11.1
125 normal negro children 11–15 yrs................	75.3	7.2	2.5	14.9	0.1
175 normal negro children 4–10 yrs................	54.1	3.5	2.5	33.2	6.7

It will be seen from the table how various groups of subjects differ from normal adults in associational tendency, especially in the tendency to respond with common specific reactions. Weakness of this tendency is usually due either to immaturity, or arrest of development, or psychotic constitution, and is characterized either by excessive proportion of individual reactions, or failures of reaction, or both.

Particular attention is invited to the showing of negro in comparison with white children: the former show the further departure from the normal adult standard.

Negro children have shown a greater tendency than white ones to give individual reactions, but they have furnished fewer failures of reaction. This is, perhaps, due to nothing more than a greater inclination to obey instructions.

In Table II. is given a classification of all the individual reactions given by the negro children in comparison with a similar classification of such reactions given by white children and by a selected group of normal adults. (86 normal adults; selected records, containing not over ten individual reactions.)

TABLE II

Types of Reaction[1]	86 Normal Adults %	300 White Children %	300 Negro Children %
Normal (by appendix)..................	41.8	20.0	12.3
Derivatives of stimulus words...........	0.3	0.1	5.7
Partial dissociation[2].....................	8.0	11.1	16.7
Perseveration[3].........................	6.1	27.8	23.0
Neologisms (without sound relation)......	—	0.6	0.3
Unclassified............................	43.8	40.4	42.0

The relatively reduced percentage of normal reactions and the excessive percentage of derivatives of stimulus words are the most striking features in the results obtained from the negro children. Both, however, may be accounted for by their heightened tendency to furnish individual reactions rather than failures of reaction.

In Table III. the material is presented by ages, similar material from white children being also shown to facilitate comparison.

TABLE III

Group Ages in Years.	Common Reactions				Doubtful Reactions		Individual Reactions		Failures of Reaction	
	Specific		Non-specific		White %	Negro %	White %	Negro %	White %	Negro %
	White %	Negro %	White %	Negro %						
4........	40.4	37.5	1.1	1.0	3.8	2.3	25.3	40.9	29.4	18.4
5........	55.1	41.5	2.0	1.4	4.4	1.8	21.4	37.4	17.1	17.9
6........	62.2	52.1	2.7	2.2	3.2	2.6	18.6	37.6	13.3	5.5
7........	64.9	56.0	4.0	3.7	3.5	2.1	20.0	35.1	7.6	3.3
8........	68.4	59.3	5.8	5.4	3.1	3.2	18.0	31.0	4.7	1.2
9........	75.1	62.3	5.5	6.5	1.7	2.6	14.2	27.7	3.5	0.9
10........	72.9	70.0	8.4	4.4	2.3	2.7	14.3	23.4	2.1	0.1
11........	82.0	74.8	7.1	7.0	1.7	2.6	8.6	15.5	0.6	0.1
12........	83.8	74.2	6.6	7.5	1.3	2.4	7.6	15.6	0.7	0.2
13........	81.1	74.2	8.4	7.2	1.8	2.6	8.5	15.8	0.2	0.2
14........	84.1	77.2	6.3	7.8	1.4	2.6	7.7	12.4	0.5	0.1
15........	78.7	76.3	7.6	6.2	2.0	2.2	10.8	15.2	0.9	0.1

[1] The Kent-Rosanoff classification was used.

[2] Under this heading are included the following varieties of reactions: non-specific, sound (words and neologisms), word complements, and particles of speech.

[3] Under this heading are included the following varieties of reactions: association to preceding stimulus, association to preceding reaction, repetition of preceding stimulus, repetition of previous stimulus, repetition of preceding reaction, repetition of previous reaction, and reaction repeated five times.

It will be seen that at every age the showing of negro children is inferior to that of white children. It would seem, therefore, that the average mental capacity of negro children is inferior to that of white children.

65.7 per cent. of negro children made a showing inferior to the average for white children; and 21.3 per cent. made a showing inferior to the lowest for the corresponding age groups of white children.

However, there is much overlapping between the racial groups. 34.3 per cent. of negro children made a showing superior to the average for white children; and 1.3 per cent. made a showing superior to the highest for the corresponding age groups of white children.

Among negro children, as among white ones, there is a close correlation between teachers' estimates of mental capacity and the showing made in the test. This is demonstrated in Table IV.

Table IV

Teachers' Estimates	Common Specific Reactions %	Individual Reactions %	Failures of Reaction %
"Dull" or "very dull" group..........	61.1	27.7	3.2
"Bright" or "very bright" group......	67.5	23.6	0.3

In collecting the material an attempt was made to distinguish, as far as seemed possible from the skin color, children who were of partly white descent from those who were without white admixture. The data for the two resulting groups are shown in Table V.

Table V

Racial Composition	Common Specific Reactions %	Individual Reactions %	Failures of Reaction %
Partly white...........................	71.3	18.9	1.4
Pure negro............................	70.5	18.0	2.3

It will be seen that the showing of the two groups—partly white and pure negro—is practically the same. The white admixture, such as it has been, has not resulted in increase of mental capacity.

The opinion is often expressed that negroes residing in southern states are different in some ways from those who have taken up residence or were born in northern states. Some think that negroes of the south are, on the whole, superior; others that they are inferior. A difference of some sort, whether resulting from selection determining the migration to the north or from the influence of northern environments, is conceivable. In order to have something more than a mere impression concerning this question we secured test records from twenty-five twelve-year-old children in the Thomy Lafon school at New Orleans, La. This school is conducted exclusively for negro children and by negro teachers. The results, in comparison with those obtained in a similar group of northern negro children, are shown in Table VI.

TABLE VI

Subjects	Common Reactions		Doubtful Reactions %	Individual Reactions %	Failures of Reaction %
	Specific %	Non-specific %			
Northern negro children.......	74.2	7.5	2.4	15.6	0.2
Southern negro children.......	72.0	9.0	2.1	16.8	0.1

The table shows a slight, probably insignificant, difference in favor of the northern negro children.

Summary.—Negro children, on the whole, show further departure than white ones from the normal adult associational standard.

At every age, from four to fifteen years, the showing of negro children is, in the average case, inferior to that of white children. It would seem that the average mental capacity of negro children is inferior to that of white children.

However, there is much overlapping between the racial groups. 34.3 per cent. of negro children made a showing superior to the average for white children; and 1.3 per cent. made a showing superior to the highest for the corresponding age groups of white children.

An attempt was made to distinguish, as far as seemed

possible from the skin color, children who were of partly white descent from those who were without white admixture. The test showed that the white admixture, such as it had been, had not resulted in increase of mental capacity.

A group of children found in a school in New Orleans, La., made a showing practically the same as a similar group found in a New York City school.

PSYCHOLOGICAL PARERGA

I. PSYCHOGALVANISM IN THE OBSERVATION OF STUPOROUS CONDITIONS

BY E. S. ABBOT AND F. L. WELLS

1. The instrument employed was a Leeds & Northrup Type H D'Arsonval galvanometer, sensibility 260 megohms, with various types of electrodes; two types of calomel electrodes, metal plates, carbon cylinders, platinum and carbon electrodes immersed in saline solution. The type of electrode used was governed by the demands of the experiment and the responsiveness of the subject.

2. Current from a Gordon Cell was used with all electrodes save a pair of balanced calomel electrodes. With the balanced electrodes body potential is measured; with the cell current, the resistance of the circuit under the conditions which the interposition of the body imposes. The 'reflex' is given in a change of either the above potential or resistance, in response to specific stimulus.

3. During the experiments, the subject reclined on a massage table. Two experimenters were usually present, one responsible for giving the stimuli, the other for the record of reaction.

4. Deflections were read from a millimeter scale. Time relations were measured with a stopwatch of high grade, operating practically without noise. Graphic registration was contemplated, but deemed unsuited to the purpose.

5. The sensory stimuli employed included the exhibition of a flash light, a red light, a blue light, as visual stimuli; a

TABLE I

	Normal Men Subjects										Normal Women Subjects									
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX
1. Total no. timed reactions	27	27	27	20	28	10, 11	9	13, 10	9, 12	10, 10	22	19	27	27	28	11	13, 13	28, 7	25	25
2. Their average time (0.2″)	11.1	15.0	14.1	17.0	14.7	18.7, 17.0	19.8	17.6, 15.1	15.9, 14.7	10.3, 18.1	15.4	17.3	14.6	17.1	17.7	18.6	16.9, 13.7	15.6, 15.1	15.0	14.8
3. M.V. of this average	4.4	1.9	2.1	2.7	2.6	1.5, 1.6	6.6	1.9, 4.9	1.6, 3.7	3.5, 4.1	1.5	3.3	2.6	2.1	1.7		3.7, 5.3	1.7, 2.0	1.9	2.2
4. Average above reaction-deflections (mm.)	14.9	7.6	6.7	7.5	6.5	2.8, 3.5	8.6	7.7, 5.8	24.6, 23.8	6.4, 4.4	7.3	5.4	3.3	6.5	4.8	2.6	3.6, 2.8	2.5, 3.9	3.4	3.0
5. M.V. of this average	9.6	2.8	2.7	3.5	3.5	1.2, 1.9	4.9	3.5, 4.6	11.7, 15.8	5.8, 2.8	3.1	2.7	1.4	2.3	1.6	1.3	1.2, 2.0	1.5, 1.6	1.4	1.2
6. Per cent. of all stimuli given to which no certain reaction-deflection was recorded	13	4	13	38	12	45	68	19, 33	44, 8	41, 53	21	43	21	21	0	61	35, 35	7, 0	11	
7. Average all positive movement, controls (mm.)	×	×	×	×	×	×	×	×	×	×	1.0	1.6	1.3	1.0	.8	.5	1.2, .5	.1, .2	1.4	1.3
8. Per cent. which (4) is of average initial deflection	4.4	2.8	2.7	2.2	2.8	1.9, ×	6.7	3.9, ×	3.4, ×	2.5, 3.1	2.9	2.9	1.2	1.1	2.3	4.0	1.5, 2.0	1.3	1.2	

loud sound-hammer stroke, a weak sound-hammer stroke, a whistle, and the dropping of a golf ball as auditory stimuli. Tactile and temperature stimuli were tried and discarded. Questions also were used with the pathological subjects.

6. The accompanying table gives results of twenty normal subjects, ten men and ten women. The control observations of item 7 were in that after each single observation, a control reading was recorded by marking a moment which would be suitable for giving another stimulus. Then was recorded the amount of any positive movement which took place within the latent time of the previous observation of reaction-deflections. Observations are reliable in proportion as these control readings are small or negative.[1] In Cases VI., VIII., IX., X., XVII., XVIII., changes of technique were necessary during an experiment. Results with the two procedures recorded are separated by commas.

7. Reaction deflections which one may expect to obtain with this apparatus, under the most favorable conditions of stimulation, average from 2 to 25 mm. according to the subject. There are large intercurrent changes of body resistance, during which, however, the same order of relation (item 8) is preserved between reaction deflection (item 4) and the base-line (initial deflection). No relation can be determined between these values and the subject's general tendency to emotional reaction; the deflections quoted are obtained under varying electro-physiological conditions, and not directly comparable.

8. In respect to latent time of reaction deflections, the data are thus comparable. It is generally understood that latent time of psychogalvanic responses varies between 2 and 5 seconds, and is governed by latent time of impulses through the sympathetic nervous system. In the present observations, latent times average often under 3 seconds, never over 4, with a median approximating 3.1. Definite responses after 5 seconds are very rare. The lower limit is necessarily less definite, being complicated by reactions from expectation.

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[1] Such movement is in itself seldom to be confused with a true 'reflex,' being slower and more continuous.

TABLE II

Case	22[1]		29[2]		35a[3]		35b[3]		59a[4]		59b[4]		73[5]	
	Sensory	Questions	Sensory	Questions	Sensory	Questions	Sensory	Questions	Sensory	Questions	Sensory	Questions	Sensory	Questions
1. Total number timed reactions..	9	10	16	8	19	×	12	10	5	5	3	4	15	9
2. Their average time (0.2″)..........	14.3	20.1	15.4	18.3	23.0	×	15.3	18.1	19.2	18.2	18.0	20.0	16.9	17.4
3. M.V. of this average	4.1	1.9	2.6	1.3	5.3	×	1.3	1.6	4.6	4.3	2.0	2.0	2.7	2.2
4. Average of reaction deflections (mm.)	20.5	33.9	38.6	39.3	3.9	×	60.9	30.6	3.0	15.8	31.0	97.0	8.7	5.3
5. M.V. of this average	13.0	4.9	22.0	16.4	2.2	×	39.7	24.7	.4	7.0	23.0	27.0	8.7	1.7
6. Per cent. failures of reaction.........	36	0	24	11	57	×	14	0	83	0	78	50	46	10
7. Average positive movement, controls (mm.)......	.8	11.2	30.2	1.0	×	×	.3	0	0	1.6	2.0	1.3	.4	.5
8. Date of observations............	7–26–12		11–6–12		7–22–12		10–15–12		7–25–12		11–11–12		7–30–12	

9. The accompanying table presents results with pathological subjects. The figures for sensory stimuli proper, and for questions, are separated. Some of the questions were of general character: *What day of the week is it; Are you married; How tall are you;* others were framed with special reference to the case history. The point at issue is how the psychogalvanic reflex is affected by the stuporous or semi-stuporous conditions in these subjects.

10. The latent times to sensory stimuli observed under stupor are within normal limits, save one not far beyond

[1] Man of twenty-three, with prolonged manic attack (May–Oct.) followed by confused depression with thinking difficulty, delusions and marked psychomotor retardation at time of experiment (100–7 in 4 min. 37 sec., 6 sec. to spell "constitution").

[2] Man of twenty-seven, manic depressive depression with considerable thinking difficulty and moderate psychic retardation (100–7 in 41 sec., in convalescence in 20 sec.).

[3] Man of twenty-four, alcoholic, with manic-depressive depression, greatly retarded and confused (100–7 in 2 min. 25 sec.) at first experiment, much improved at second experiment.

[4] Woman of nineteen, religious, overconscientious; at first experiment in mixed phase, manic stupor; little spontaneity, some impulsive episodes, generally mute. Much improved at second experiment.

[5] Woman of twenty-three in fourth depression, with marked psychomotor retardation. At time of experiment comparatively normal, only fatiguing easily.

(35a). This indicates a perception of the stimuli but little slower than the normal, not in proportion to the slowness of the subjects' ordinary behavior. Some slowing of the perceptive process is a possible inference from the shorter latencies which Cases 35 and 59 show after much improvement from the retarded condition.

11. The mention of latent times made in the extensive study of Gregor and Gorn (Zt. f. d. Ges. Neur. u. Psychiat., 1913, 16, 1–105) appears consistent with present results.

12. It is presumed that the mental process involved in this reflex to the sensory stimuli is relatively simple, little associative elaboration being necessary to the organic processes of the reflex. The questions mentioned were asked the subject, to examine if greater perceptual retardation existed where associative processes of higher level were called into play.

13. It is necessary to consider if the reaction is to the perception of the question's content, or to its character as a sound stimulus merely. Evidence is found in the ordinary behavior of the subjects; the fact that they reacted relevantly if slowly to things said to them in their daily hospital surroundings. There are much fewer failures of reaction with the questions than with the sensory stimuli proper (item 6), indicating a more certain arousal of psychic response by the the sentences (their sensory quality was scarcely more coercive than the lights, etc.). Relevant answers might be made to the questions, these coming sometimes before, sometimes after the psychogalvanic response. It is indicated that the psychogalvanic responses to these questions represent a rational comprehension of the question, by the conscious of the main personality. That the comprehension is as complete or has as much associative elaboration as it would in a normal mind, is impossible to say. There is nothing in the records pointing otherwise.

14. Latent times to the questions are generally longer than to the sensory stimuli proper, but this is not regarded as a function of the psychosis. Reaction to more complicated stimulus takes longer in normal life; cf. also the records of 59a and 73.

15. Psychogalvanic reactions are reflex in that they are not directly governed by conscious volition; they are not induced or inhibited by will thereto. Their reflex character differs from that of the patellar or wink reflexes, in that they are governed less by the external stimulus and more by the internal elaboration of that stimulus. Among mental processes emotion is said to be the essential mental process which induces them and governs them much more closely than it does knee-jerk or the wink. Normally, consciousness of a mental event is a concomitant of emotional reaction attaching thereto. It is not necessarily so; psychogalvanic phenomena have been themselves invoked to demonstrate the presence of sympathetic reactions whose mental causes were not conscious (Sticker, Peterson and Prince). Their observations refer to hysterical types of dissociation, which have not been demonstrated in the manic-depressive group here involved. Conscious perception of the stimulus is positively indicated where relevant verbal response occurs as well as psychogalvanic reflex. It is doubted that the possibilities of coconscious perception have other than theoretical bearing on the present observations. Psychogalvanic response does not in either case take place without *some* perception of the stimulus, whether or not integrated with the personal consciousness.

16. It is indicated that the perceptive processes in conditions of manic-depressive stupor are but slightly lengthened from the normal. The associations in the present instances were formed with about the same rapidity as in health. The retardation may lie in a lessened complexity of the associations formed, or in the slower and feebler conversion of these associations into their motor expressions.

II. PSYCHOTIC PERFORMANCE IN CANCELLA-
TION AND DIRECTIONS TESTS

BY F. L. WELLS

17. In 1915 a series of choice reaction experiments was carried out to investigate how far the vital maladaptations of the psychoses are reflected on this more superficial level of the laboratory. The results of these experiments, which indicated that they are very slightly if at all so reflected, have been published.[1] Contemporaneously with these experiments, and with the subjects involved in them, observations were made with (a) a cancellation test, termed in this study test NC;[2] (b) a form of the Woodworth-Wells easy Directions Test, termed in this study test D1; (c) a form of the Woodworth-Wells easy Directions Test, termed in this study test D2; (d) the Woodworth-Wells hard Directions Test, termed in this study test D3.

18. The experimental instructions were in writing, and are quoted in the normal order of experiments. (See pp. 367–369.)

19. The score in each test is the total time of accomplishing it, increased by 10 per cent. of itself for each error made. Certain minor defects were scored as half errors.[3]

20. There are records from 8 normal and 9 pathological subjects, who are designated in the same manner as in the choice reaction tests mentioned. Results are presented *en profile* on the following pages, where the horizontal lines represent the fastest, average and slowest normal performance (corrected for errors), and the points of the curve represent the performances of the pathological subjects.

[1] Wells & Sturges, *Am. J. Ins.*, 1918, **75**, 81–119.

[2] For description of tests in this study, *cf.* Woodworth and Wells, Association Tests, Psychological Monographs No. 57, 1911.
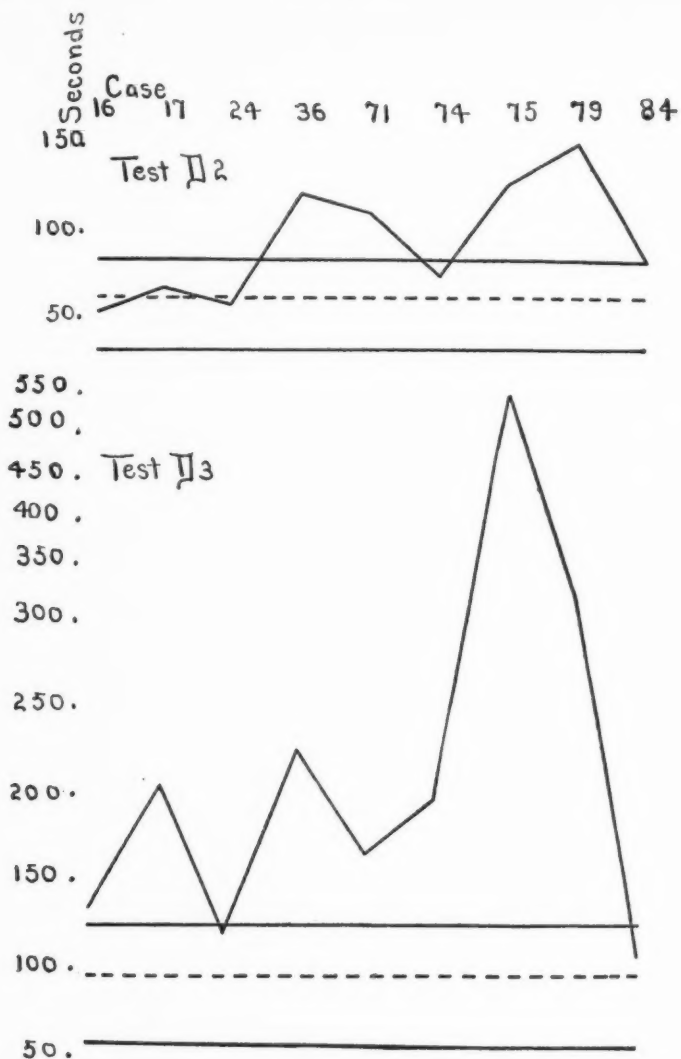
[3] Effort was made in the course of these experiments to satisfactorily record the time of the individual responses in the directions tests. Use was made of a pencil operating simply by gravity, to break electric contact during the writing stroke. The device is adapted only to intelligent and fully coöperative subjects. The plan generally followed was for the experimenter to press a key recording on a tape, in time with the reactions of the subject. These pressures can be coded so as to make the tapes easy to read.
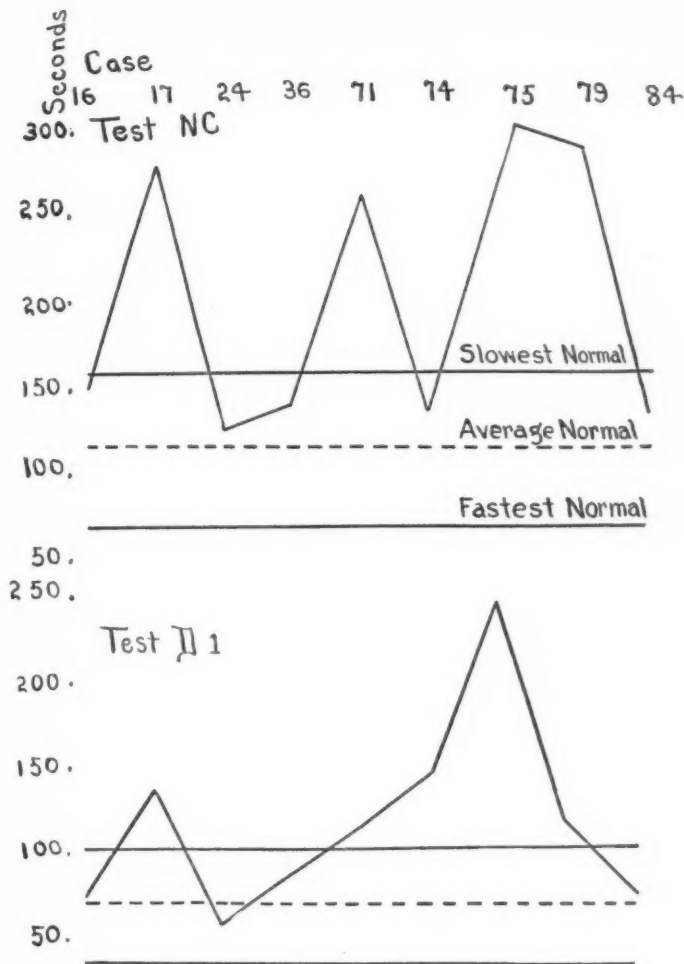
(Test NC.) At the word 'go' take away the blank sheet in front of you from the paper that it covers, and you will see on this paper several lines of figures like this:

45879236017418605923596084231782130756494582976301
76484395121947250836364570129865283940172376941850

Every line has five each of the figures. Begin at once to go through the lines of figures with your pencil and cross off every figure o that you come to. There will be 5 o's in each line, 100 in all. Do this as quickly as you can without missing any or crossing out a wrong figure.

Seconds

Case
16   17   24   36   71   74   75   79   84

150

Test D2

100.

50.

550.
500.
450.   Test D3
400.
350.
300.

250.

200.

150.

100.

50.

(Test D1.)   At the word 'go' take away the blank sheet in front of you from
the paper that it covers, and you will see on this paper directions for different things
you are to do with your pencil, such as 'Put a dot under the e in carpet,' or 'Make
an x after the girl's name; John, Mary.'   Begin at once to go through the list doing

21. The separation of normal from pathological subjects is greatest in D3, distinctly less in the remaining tests. Compared with this separation in the choice reaction experiments, tests NC, D1, and D2 have as many cases within normal limits of speed, though they do not reach into these limits so far. In the present tests with four kinds of measures, there are two cases, in the same subject, where the normal average is surpassed. In the choice reaction experiments, with seven kinds of measures, this happens in nine cases with five subjects. In the choice reaction experiments the pathological cases did not make more errors than the normal. This is also the case with tests NC and D2; with tests D1 and D3 the psychotic cases make many more errors. D1 and D2 are intended to be of equal difficulty; here D2 appears to be easier, perhaps owing to its coming immediately after D1 and gaining its 'practice' effect.

22. The more complicated or 'synthetic' of these experiments accomplish better separation of normal from pathological subjects. The chief separation of the latter is indeed through the most synthetic of all tests, that of practical life. In a limited field, notably that of memory, the laboratory has been not unsuccessful in analyzing the mental failures of psychosis. But it is generally difficult to show psychotic deviations from the normal in the analytical procedures of the laboratory. With manic-depressive and schizophrenic conditions such as are here involved, analytic progress of the laboratory is slight. Here the laboratory separates normal from pathological rather through synthetic experiment involving the unanalyzed, damaged functions. The synthetic situation may be controlled experimentally as in this study. To do so has objective and quantitative advantages. It is important in the diagnosis of defect con-

each thing with your pencil as directed as quickly as you can without making mistakes. Thus in the cases above, you would make a dot under the e in carpet, and an x or a cross mark after the word " Mary," following the directions given.

(Test D2.) At the word ' go ' uncover the sheet and do the same as last time. This is the same kind of test as before, but with another set of directions.

(Test D3.) At the word ' go ' take away the cover sheet and do the same as last time. This is also the same kind of test but the directions are a little harder.

ditions, feeble-mindedness. The observational method more closely reconstructs the actual life synthesis in which the patient has broken down. For mental disease it is still a better criterion than psychological tests.

23. Qualitatively, the pathological subjects above are distinguished by the presence of 'overmarking,' *i.e.*, the use of more pencil strokes than necessary for compliance with instructions. Examples of this are the making of more than one stroke to check a zero in test NC; drawing a wavy line 'around the three dots' instead of the normal oval (D1); marking the 'line that looks most like a hill' (D2) by sketching an arrow pointing towards it; writing *in the east* to 'tell where the sun rises' (D3); writing script instead of Arabic numerals for number answers. The most overmarking is in the disturbed cases. The terminal dementia præcox 75, however, checked all his zeros with meticulous cross-marks.

24. A series with case 36 (manic-depressive excitement), made three weeks after the first, shows less excitement in manner of execution, and is also more rapid and correct. With case 71 (constitutional psychopathy), there are two series nearly three months apart; at the time of the first he appears to have been depressed, later more normal for him. The second records are more rapid, but contain mistakes absent in the first. There is much overmarking in both series; neither is as good as the normal average. Eighteen months later, while not under institutional care, he underwent the Stanford Revision series with an IQ of 1.18. Later he committed suicide. For case 75 (terminal dementia præcox) there are experiments on four days; three within a week, the fourth some five weeks later. The times at the beginning are very long; the later experiments show a great reduction, which is not explained. It is of course not paralleled by any change in the patient's mentality. Nor is it usual to see practice phenomena of this extent in pathological cases. Three series of experiments with case 84 (probable dementia præcox on psychopathic basis) again point to slower performance at times of greater excitement. His records are nearly errorless and reach unusual speeds.

25. For case 79 (circular manic-depressive), there are two complete series some ten weeks apart. Two weeks previous to the earlier of these a series was attempted, but the patient was in too great an excitement, and his adjustment broke down after accomplishing 11 lines of test NC. This record required 295 seconds for 11 lines with one error. The marking begins with single strokes; overmarking starts at the fifth line and increases to the termination of the record. In the two complete series, this excitement was subsiding. The last, less excited series is much more rapid than the earlier. Both show characteristic errors such as writing *g* for 'any letter except *g*'; *yes* for 'write *no* if 2 times 5 are 10.' It is suggested that tests of this kind be used for objective records of psychomotor excitement.

III. ASSOCIATION TYPE AND PERSONALITY

BY F. L. WELLS

26. It is desired to complete the presentation of experiments on personality and the association test previously mentioned,[1] and of other data gathered in connection with them.

27. Consensus among investigators of its pathology is that association reactions are more closely related than other experimental procedures to the degree of conflict in the individual's mental trends. The indication of the present study is that such relationship cannot be objectively stated until the conception of mental conflict is better defined, and leads to a scoring of the test more efficient for the purpose.

28. Among the measurable functions of the free association test, reaction times serve chiefly in interpretation of single responses. The formula $\dfrac{\text{av. react.-time}}{\text{med. react.-time}}$ has been suggested by Lang[2] as a criterion of the 'psychic resistance' of the subject to the experimenter. The higher the figure,

[1] 'Mental Adjustments' (D. Appleton & Co.), 1917, pp. 262–266.
[2] *Psychologische Abhandlungen*, 1914, 1, p. 2.

the greater the 'resistance.' Practically, a high resistance is thus indicated by reaction times that take excessively long in comparison with the median.

29. The *commonness* or *singularity* of responses is measured in their per cent. of occurrence among large numbers of subjects. This criterion is thoroughly objective, but is limited to the Kent-Rosanoff list of stimulus words, for which alone satisfactory comparative material exists. The frequency of each word is found, and the median of all such findings gives the subject's score in the function. It is designated by the letter c ('community' of response).

30. The five logical categories of responses have been formulated in an earlier paper.[1] The mechanism of the egocentric category is inversely related to that of community in response. Correlation (r) of -75 is observed with 25 subjects.[2]

31. The supraordinate category has a moderately positive relation to community of response, the r being 29. It has correspondingly negative relation to the egocentric category, this r being -30.

32. The mechanism of contrast responses is directly related to that of community in response, their observed r being 61. Correspondingly, the r of the contrast and egocentric category is -62; of the contrast and supraordinate categories, -34.

33. The *miscellaneous* category sustains with the community of responses an r of 25; with the egocentric category, r is -53. The egocentric and miscellaneous categories are a large part of the responses, and increase in one is at the expense of the other. The miscellaneous category is without clear relation to the supraordinate and contrast categories.

34. The speech habit category is uniformly too small to show significant relationship with these other functions of the experiment.

[1] *Cf.* PSYCHOL. REV., 1911, 18, 229–233.

[2] These include the ten selected individuals of paragraph 41 and are thus subject to a dilation of the r's. However, the r between c and egocentric category is -74 in two arrays of 14 unselected subjects. In an array of twenty-five subjects not thus selected the r of supraordinate and contrast categories is -51.

35. Relationships of present concern are the positive relation of the community index *c* with the contrast category, and the negative relation of these two to the egocentric category. On these lines are drawn the objective differences in association type. At one extreme is the type with low *c*, many egocentric and few contrast reactions. At the other extreme is the type showing (see paragraph 37) high *c*, few egocentric and many contrast reactions.

36. Superficial rating was obtained of fifteen persons in respect to such traits as intelligence, talkativeness, promptness, persistence, tendency to shape surroundings, tactfulness, conscientiousness, truthfulness, cheerfulness, depth of mood, self-appreciation, sensitiveness. When compared with above differences in the free association test, no separation of groups according to any of the ratings is indicated. Significant relation is shown neither with traits where previous experience has not indicated relationship, such as intelligence, promptness, self-appreciation, nor with traits where correlation is more to be expected, as depth of mood, sensitiveness, conscientiousness.

37. Quantitative idea of this situation is afforded in the following figures, which separate the subjects according to their records, more resembling the one or the other of the above types (paragraph 35). The average position of either

TABLE III

	Group of Lower *c* More Ego-centrics, Fewer Contrasts		Group of Higher *c* Fewer Ego-centrics, More Contrasts	
	Av.	M. V.	Av.	M. V.
Intelligence...............	8.8	4.7	7.4	3.3
Talkativeness.............	8.7	3.0	7.6	4.2
Promptness...............	8.2	4.5	7.9	3.2
Persistence...............	5.7	3.3	9.6	3.3
Self assertion.............	7.7	4.3	8.2	3.3
Tactfulness...............	7.7	4.0	8.2	3.5
Conscientiousness..........	6.5	3.8	9.0	3.5
Truthfulness.............	6.0	4.2	9.3	3.4
Cheerful mood........−....	7.0	2.3	8.7	4.3
Depth of mood............	6.2	3.5	9.2	3.5
Self-appreciation..........	8.5	3.2	7.7	4.3
Sensitiveness.............	7.0	4.0	8.7	3.7

(The *smaller* the Av. figure, the *more* marked is the trait)

group in a trait, and its mean variation, is compared with these figures for the other group.

38. Personality-type A from the group of paragraph 36 is an individual rated as especially intelligent, prompt, persistent, active (shaping surroundings), conscientious, truthful, deep of mood, sensitive, not at all loquacious. Personality-type B is an individual rated as especially intelligent, prompt, active, self-appreciative, loquacious, superficial in mood; rated low in truthfulness, conscientiousness and sensibility. As contrasted, A is quiet and B is loquacious; A is conscientious and truthful, B is much less so; A's mood is deep and B's is superficial; A is sensitive, B is insensitive.

39. Initial association tests of these two personalities compare as follows.

	Time	Middle Quartiles	c	Per Cent in Categories				
				Eg.	Su.	Co.	M.	S. H.
A................	13.4	7.4	2.2	58	4	1	34	3
B................	9.5	3.6	3.8	14	1	31	50	4
Norm. Av.........	12.1	6.2	8.6	27	9	16	46	2

The range of the middle quartiles is subject to about the same interpretation as Lang's 'coefficient of resistance.'

40. The record of A approximates the normal limit of individuality of response, egocentric and contrast categories; these functions standing in their normal relationships. B is near the opposite normal limit in respect to egocentric and contrast associations. The above recorded relation of c to these categories is not sustained in this subject. The associations are not so individual as A's, but much more so than the average. The direction of all differences in the figures is consistent with the personality ratings of paragraph 36. Reaction time and logical categories represent the difference in good proportion; c fails to do so.

41. A selection was made, outside the experimenter's knowledge, of five new persons supposed to temperamentally resemble A, and five persons resembling B. Figures on which the subjoined comment is based are given herewith:

	Med. Assoc. Time.	Per Cent. which Av. is of the Med.	Frequency c	Eg.	Su.	Co.	M.	S. H.
A-Selection subjects: 1....	8.9	1.05	3.8	42	2	7	49	0
2....	11.6	1.22	3.9	52	10	0	37	1
3....	16.3	1.25	3.6	42	16	0	40	2
4....	11.2	1.05	6.7	32	14	2	49	3
5....	11.5	1.16	5.4	32	12	1	53	2
B-Selection subjects: 6....	9.7	1.27	5.4	41	9	1	47	2
7....	17.8	1.21	3.4	44	6	0	48	2
8....	17.2	1.18	14.3	18	21	16	43	2
9....	11.2	1.50	14.6	26	18	16	38	2
10....	9.7	1.04	15.5	9	7	29	53	2

42. Previously observed relation between reaction time and egocentric response is not absent from this material. Lang's criterion of psychic resistance also shows correspondence to egocentric reactions. Neither time function effects a separation of groups.

43. A control of the intellectual factor in association time as distinguished from affective and volitional ones was sought in giving an opposites test (Woodworth-Wells No. 1) in connection with the free association test. Nothing of significance for the problem was indicated in this direction.

44. The four words *high, white, slow* and *long* occur in both Kent-Rosanoff and opposites lists. A comparison is afforded of reactions to the same stimulus under free association and opposites 'mental sets.' For all subjects, the median reaction time in the free association set is 11.5, in the controlled association set it is 6.2. In nine cases a subject responded identically to a stimulus word in both forms of test. The median time of these cases is for free association 13, for opposites 6.

45. In respect to c there is cleavage between seven subjects having c of 6.7 or less, and three subjects having c of 14.3 or more. These three subjects are of the group selected as *B*. It follows that all the *A* selections and two of the *B* had low c.

46. In egocentric reactions the above three subjects have a per cent. of 26 or less, the remaining subjects a per cent. of 32 or more.

47. In respect to contrast reactions these three subjects have a per cent. of 16 or more, the remaining subjects a per cent. of 7 or less.

48. In the other categories there is no cleavage. Upon one side of the observed cleavage are all the *A* selections and two of the *B* selections.

49. Negative findings of the foregoing are open to interpretation that the scoring of the test is faulty. This is in part true. Different weights should probably be assigned to different sorts of egocentric reactions. While this is the chief improvement to be seen at present, it is not expected that it would change the situations essentially. The three factors of c, egocentric and contrast associations, are also to be weighted and combined. This process requires adjustment of the weights to give the best correlation with the trait to be measured. The weighting is not yet practicable because an independent and controlling measure of mental conflict has not been determined.

50. Failure in the mental rating of the subjects is the more important factor in the failure of correlations. Estimate of mental conflict in a personality, without special analysis, is subject to large error. Study of pathological material introduces a further consideration, the relation of the mental conflicts to consciousness.

51. The relation of the test to personality is hardly so simple as Jung, Pfister or Ferenczi state it. From the clinical record of the test, its fidelity to type, and its intercorrelations, it is improbable that this relation is too complex to formulate. Its practical application remains an art.

IV. AUTISTIC MECHANISMS IN ASSOCIATION REACTION

BY F. L. WELLS

52. This discussion is immediately based upon association records in the Kent-Rosanoff experiment upon 21 pathological cases, whose data are summarized in the accompanying table. Certain of the cases have designations identical with those in

the study on cancellation and directions tests. These allude to identical individuals.

TABLE IV

Association Reactions in Psychotic Individuals

The ages given in the footnotes are those at the time of the single or first experiments

	16[1]	17[2]	21[3]	23[4]	24[5]	29a	29b[6]	36a	36b[7]
Median reaction time (0.2'')	14.2	10.9	9.3	10.6	9.6	14.1	11.1	29.0	8.0
c, index of community	1.0	9.8	9.3	11.0	4.4	.23	.29	11.5	6.5
Per cent. egocentric responses	59	8	8	17	37	31	37	19	13
Per cent. supraordinate responses	0	3	3	1	17	0	0	27	21
Per cent. contrast responses	1	30	30	28	0	0	0	13	7
Per cent. miscellaneous responses	30	54	53	49	46	25	24	41	58
Per cent. speech habit responses	10	5	6	5	0	44	38	0	1

	45[8]	46[9]	57a	57b[10]	59[11]	62[12]	66a	66b[13]	71[14]
Median reaction time (0.2'')	16.5	36.6	50.5	47.6	17.4	16.0	22.7	10.8	13.2
c, index of community	.62	3.0	2.0	.30	4.3	.87	3.0	10.0	.80
Per cent. egocentric responses	51	48	39	50	7	43	14	8	46
Per cent. supraordinate responses	7	1	22	10	10	4	28	14	0
Per cent. contrast responses	1	3	4	3	12	2	7	24	4
Per cent miscellaneous responses	37	47	33	27	79	44	48	48	42
Per cent. speech habit responses	4	1	2	10	2	7	3	6	8

	73[15]	74a	74b[16]	75a	75b[17]	79[18]	84[19]	93[20]	98[21]
Median reaction time (0.2'')	13.2	11.2	8.6	18.0	25.0	11.0	13.1	13.0	11.4
c, index of community	2.1	9.5	14.0	1.3	.30	5.5	6.5	13.0	3.4
Per cent. egocentric responses	72	10	5	43	53	24	16	19	23
Per cent. supraordinate responses	5	8	5	2	0	6	2	14	5
Per cent. contrast responses	1	35	33	0	0	14	27	17	14
Per cent. miscellaneous responses	22	45	56	51	47	51	55	47	53
Per cent. speech habit responses	0	2	1	4	0	5	0	3	5

[1] Man, thirty-nine. Inferior personality. As a child "reticent, cold, hard to understand." Manic depressive, improvement from fifth attack (excitement). Disorder chiefly formal, without conscious trends.

[2] Man, thirty-six. Somewhat shut in personality. Tense, agitated depression. Other symptoms such as would be secondary to this. Trends from the unconscious not elicited. Dementia præcox outcome.

[3] Man, sixty. Average personality. Manic-depressive depression, second attack. Formal depression, somewhat agitated, without trends.

[4] Man, thirty-three, capable personality, history of syphilis. Manic-depressive depression with firm delusion of having General Paralysis as result of luetic infection. Depressive sexual ideas, otherwise no special autistic content.

[5] Man, forty-five. Religious, conscientious personality. One previous attack, precipitated by death of mother. Manic-depressive depression, colored by self-accusation for persistent masturbation. No other autistic content.

[6] Man, twenty-seven, competent personality, rather sensitive. Manic-depressive depression, with disproportionate thinking difficulty, or reticence, or both. Only marked trends are in written self-accusations. Tests are at height of psychosis, and on leaving "much improved."

53. In respect to association time, such separation from the normal as appears is secondary to other factors in the

[7] Man, twenty-one. Psychopathic personality, repeated manic-depressive attacks. Disorder chiefly formal, not exhibiting conscious trends. First record in excited, second in depressed phase.

[8] Woman, forty. Psychopathic heredity; capable personality, first attack at thirty-seven after strain, other attacks following. "Internal rebellion," self-description by patient. Evidence of sexual trends; *e.g.*, instructing younger brother, delusions of marriage.

[9] Man, thirty-four. Some heredity, capable personality. Manic-depressive depression, some general suspicion and ideas of reference, no elaborated delusions. Poor coöperation in test, made at beginning of recovery.

[10] Man, thirty. Normal personality. Typical dementia præcox. Scattering and mannerism evident from admission. Precipitating cause or trends not elicited. Good coöperation in both tests. Much more dilapidated at second test, six months after first.

[11] Woman, nineteen. Overconscientious, avoided opposite sex. Manic-depressive, repeated attacks. At test, recovering from confused phase. Indication of much autistic activity that reaches conscious expression but very fragmentarily.

[12] Woman, fifty. Circular manic-depressive attacks since eighteen. At period of test, mixed phase. Easily offended, demanding much attention, ideas of man concealed in room. Test made at beginning of improvement from this condition.

[13] Man, forty-six. Capable personality, married. First attack of depression, precipitated by worry over attachment to young woman. Fair insight. First test upon admission. Second test eight months later, shortly before discharge, "much improved."

[14] Man, twenty. Psychopathic personality (over-intellectual, imaginative, sensitive, self-centered) plus manic-depressive episodes. During these, some dissociation, and autistic elaborations. Later suicide.

[15] Woman, twenty-three. Religious, intellectual personality. Manic depressive psychosis, fourth attack, depression. Retardation, reticence. Some autistic thinking during psychosis, described retrospectively. Test after substantial recovery.

[16] Man, twenty-four. Psychopathic inferiority, manic-depressive episodes (circular). Psychosis of formal character, intellectual symptoms secondary to motor and emotional state. The first test is in excited phase; the second, four months later, at subsidence of the excitement.

[17] Man, thirty-three. Shut-in personality. Dementia præcox. Rich elaboration of autistic trends. A period of eighteen months, with gradual dilapidation, intervenes between the two tests.

[18] Man, twenty-one. Conscientious, sensitive personality. Manic-depressive mixed phase, second attack. Masturbation complex. No elaborated delusions or hallucinations.

[19] Man, thirty-two. Competent personality. Dementia præcox. Evidence of considerable autistic thinking, not especially systematized in its conscious expression.

[20] Woman, thirty-two. Retiring, overconscientious. Attack precipitated by death of man to whom had been attached. "Voices," ideas of influence, considerable conscious autism. Recovery after treatment of ear condition.

[21] Man, fifty-six. Competent personality. Manic-depressive depression, one previous attack. In this attack, accounts of hallucinations, with religious and marital delusions, subsided at time of test. Alcoholism involved.

cases (as in choice reaction performance, *cf. Am. J. Insanity*, 1918, 75, p. 117). Lengthened time is consistent with depressive retardation, manic distractibility, schizophrenic blocking or apathy.

54. In the above, lengthened time in the second experiment with case 75 marks the progressive deterioration, but fails to do so in the already much blocked 57. Case 36 is depressed in first experiment; second is in excited phase, and very much quicker. In cases 66 and 29 an improvement from depression is also accompanied by decrease in time. In case 74, the same accompanies a subsidence of excitement.

55. Decrease in c accompanies schizophrenic deterioration (75, 57). Increase in c accompanies improvements from manic-depressive states (74, 66, 29). Excitement shows lower c than depression in case 36.

56. Save in marked deteriorations, pathological subjects differ from the normal much less than normal subjects from each other. The difference of normal and pathological is much greater is respect to vital adaptations than in respect to association reactions. It is suggested that interpretation of the last named be sought in mechanisms common to both normal and pathological psychology, rather than in more distinctively pathological processes. The basal conceptions providing such interpretation will be passed in rapid review.

57. There are in every person's mind a number of trends which, when they govern the conduct of vital reactions, result in mental disease. These traits are included in Bleuler's concept of *autism* or *autistic thinking*. Where autistic trends meet those of logical or realistic thinking, a conflict is often set up. These conflicts are what is essentially understood in the conception of mental conflict. To the extent that the person is aware of these conflicts they are *conscious*. Of some there may be no awareness, and they belong to the *unconscious*.

58. Normal voluntary behavior is represented in consciousness; the psychic system that directs it is the 'conscious' personality, the 'main' personality. When various autistic trends normally unconscious or ineffective come to

expression in the consciousness of the personality or the conduct of its body, symptoms of mental disease ensue. The type of symptoms depends on the sort of expression these autistic trends establish. Autistic 'break-through' into the motor sphere is expressed in stupors and in manic or catatonic excitements. 'Break-through' in the affective sphere is shown in mood alterations not consistent with reality as the patient sees it. These are distinctly pathological forms of 'break-through.'

59. In the intellectual sphere, autistic *thinking* proper reaches the normal consciousness through dreams, wit, and various beliefs with rather benefit than harm to the personality. It is further represented in the normal consciousness through sundry mental attitudes, prejudices, intuitions. Deeper emotions, though with conscious rationalizations, have instinctive and autistic determinants. Pathologically, it is a source of delusions and of scattered ideation.

60. The associative stimulus and response is an arc of the 'third' level, normally involving consciousness. The relation between stimulus and response is one known to the subject. It is not necessary that the mediate elements in the association be consciously thought of, but it is within the subject's power to think of them. The indicated conception is that the association reaction is influenced not by mental conflict whether conscious or unconscious, but rather through the representation of the conflicting trends in consciousness. However severe the formal character of the psychoses (Cases 17, 21, 36, 74, 98) the association type is influenced only as the content of the conscious is affected.

61. The content of the conscious is thus affected in two ways. The normal presence or pathological break-through of autistic trends into the conscious, often results in mental conflicts that induce a special attitude of self-reference, somewhat as there is greater consciousness of a bodily organ when 'conflict' of its functions occurs. A natural expression of such attitude of self-reference, in the association experiment, is the egocentric-predicate type of reaction. The responses may be extremely unusual, though preserving a relevancy con-

sistent with normal experience.[1] Examples of this reaction
type are the records of Cases 24, 45, 62, 71, 75. This type
results from the conflicting interaction in consciousness of
the autistic trends and those of logical, realistic thinking.

62. Autistic trends may be intruded on the main personal-
ity with little if any conscious relation to the trends of
realistic thinking. The latter are simply displaced for the
occasion. This is the mechanism of 'scattered ideation,'
Association responses so determined are egocentric in that
they are highly individual, but they cease to have a relevancy
consistent with normal experience. This type is mostly
seen in the schizophrenic forms of mental disease. Examples
from the present material are the records of Case 57. Records
exemplifying the above types are fully quoted in the mono-
graph of Kent and Rosanoff.

63. Egocentric reactions are not a direct result of the
autistic conflict. They express rather a usual concomitant
of such conflict, as attitudes of self-reference (paragraph 61).
In cases 23, 59, 79, 84, 93, some notable degree of pathological
autism fails to so affect the association reactions. Though in
the presence of grave mental disorders, not without constitu-
tional factors, objective association types are produced. The
egocentric type would be more consistent with the contents of
these psychoses as they are recorded. It is not indicated what
is the special relation of these autistic intrusions to the main
personality, through which objective association type is
preserved.

64. In case 16, the egocentric reaction type appears less
a product of the psychosis as such than of the personal con-
stitution. Either factor is such as to account for the reac-
tions exhibited by cases like 71 or 75. The heaping up of
speech habit responses in Case 29 is unexplained. These are
often lengthened, giving the appearance of repression phenom-
ena in line with the atypical reticence of this case. Other-
wise the type is egocentric.

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[1] Through such channels as described in the 'Appendix' to the Kent-Rosanoff
frequency tables.

V. EXPERIMENTS CONCERNING THE THRESHOLD
OF CONSCIOUS LEARNING

BY F. L. WELLS

65. The technique is derived from that described by
Benedict and Dodge for the study of memory.[1] Its special
features here are sufficiently described in the instructions to
the subject, which are as follows:

In the aperture before you, where you see the white paper now,
there will appear gradually, and one by one, a series of one syllable
English words, each word being followed by a single figure, like this:
short 2, cream 4, court 1. As soon as you see the figure strike the
corresponding key on the board at your side. For the figure 1
strike the first key with the thumb; for the figure 2 strike the second
key with the forefinger; for 3 strike the third key with the middle
finger; for 4 strike the fourth key with the fourth finger; for 5
strike the last key with the little finger. Thus in the first case
above, short 2, you would strike the second key, with the forefinger.

These same words will then be repeated several times and each
time one of the words appears, strike the key for the figure that
follows it, as soon as possible, no matter whether the figure itself
is where you can see it or not. Of course the first time you will
not know what the figure is until you have seen it, but as the words
come over and over again you will learn what figures correspond to
what words, and will be able to strike the right key as soon as you
have seen enough of the word to know what it is. Wait until you
have seen at least the first letter of the word before you strike the
key for it.

Do this as quickly as you can do it correctly. Strike each key
with a quick, sharp motion, so as to make sure of a good contact,
but letting it up again as soon as a good contact has been made
(as a typewriter key would be struck).

66. The stimuli were printed on sheets of paper to fit
the kymograph. Recording thereon was with the Dodge
double marker for reaction and time line. The speed of the
drum approximated 14 mm. per second. False reactions

[1] 'Psychological Effects of Alcohol,' Carnegie Institution of Washington, 1915,
pp. 129–30.

were separately recorded on a ribbon register. Observations up to as many as 50 rounds have been thus made.

67. The subject is free to react as soon as he sees the first letter of the word. As such short reactions as these are scarcely evident in the records, it is indicated that time of reaction after a response has been learned, is governed by visual recognition of the word to which the number attaches, or of the number itself. It is still objectionable that effort may be made to memorize the succession of figures without reference to the words to which they attach. This would produce reactions in effect premature. It is owing to this situation that the work is not carried further than is here reported. It is desirable to vary the order of the stimuli, which is not practicable with the kymograph exposure method.

68. A set of cards was prepared, each of which bore a word cut from a kymograph stimulus sheet, without its number. At specific times in the experiments, these cards were shown in varied orders to the subject, who gave verbally the number attaching to each word as well as he could remember it. This gave information of the subject's verbal knowledge of the pairs at different points in the experiments. The observations with the cards were regularly made at the beginning of an experiment, after the first ten rounds with the kymograph, and at the conclusion of the experiment. The score in this portion of the experiment is the number of right answers minus the number of wrong answers.

69. Items of results presented are as follows:

1. Initial knowledge of pairs, *i.e.*, of numbers attaching to words presented on cards at the beginning of experiment, score right answers minus wrong answers.

2. Rounds 1–10, number of false responses as derived from ribbon record.

3. Rounds 1–10, number of delayed responses, *i.e.*, those responses which are longer than the initial response, indicating a loss of learning effect, through either immediate distraction or forgetting.

4. Rounds 1–10, number of anticipatory responses, *i.e.*, those which come before the full exposure of the stimulus.

As shown in the profiles, there is continuous gradation from these to the responses requiring full reaction time after the exposure. In the above anticipatory responses, correct response is evidence that the subject well knew what the response should be, before seeing the number representing it.

5. Knowledge after round 10 of the numbers attaching to the words, derived as for item 1.

6. Rounds 11–20, number of false responses, derived as for item 2.

7. Rounds 11–20, Number of responses delayed beyond the time of initial response in round 1.

8. Rounds 11–20, number of responses delayed beyond the time of response in round 11.

9. Number of anticipatory responses, derived as for item 4.

10. Knowledge of pairs after round 20, derived as for item 1.

70. Results are summarized in the accompanying table:

TABLE V

Subject	I				II			
Designation of Experiment	a	b	c	d	a	b	c	d
Date	1-8-16	1-11-16	1-14-16	1-4-16	1-5-16	1-6-16	1-7-16	1-9-16
1. Initial verbal response (right minus wrong)	×	3	16	20	−1	3	4	3
2. Rounds 1–10, no. false responses	5	9	4	0	4	7	5	0
3. "　" no. delayed responses	39	14	19	35	54	27	36	24
4. "　" no. anticipatory responses	30	29	101	129	0	7	19	3
5. Knowledge after rd. 10 (right minus wrong)	1	10	20	20	−1	6	11	10
6. Rounds 11–20, no. false responses	0	2	5	5	3	5	8	2
7. "　" no. responses delayed over rd. 1.	60?	16	41	30	5	7	29	12
8. "　"　"　"　"　" rd. 11	22?	16	56	64	36	35	64	68
9. "　" no. anticipatory responses	0?	29	84	122	0	18	44	16
10. Knowledge after rd. 20 (right minus wrong)	6	10	19	20	1	12	18	11

Notes: Experiment *a* with both subjects contains ten and five kymograph rounds; experiments *b*, *c*, and *d* contain ten and ten. The figures questioned in experiment *a* of Subject I. are anomalous.

71. Learning in the experiment is measured in two ways, by the verbal responses to the cards and by the key responses to the kymograph exposures. The verbal responses above

show learning by their progressive increase in score (items 1, 5, 10). Progress of learning during one experiment, as well as loss of learning from the end of one experiment to the beginning of the next, are here illustrated. Subject I. makes practically perfect score after the tenth round on the third day (item 5). In the long interval between the third and fourth experiments with Subject II., more has been lost than is made up in the fourth experiment.

72. The kymograph exposures show learning through the increased number of anticipatory responses (items 4 and 9) and earlier time of their appearance, both progressive through the experiments. The last experiment with Subject II. again shows excessive loss from the long interval.

73. False reactions and delayed responses demonstrate neither progressive tendency nor individual difference.

74. Responses in these experiments are essentially voluntary, requiring mediation of consciousness. After the first stimulation-reaction, its pattern has been experienced, and may be established in consciousness. More usually it is not at once so established, but requires several repetitions, during which it moves up towards the threshold of consciousness, occasionally crossing it and being 'remembered,' then slipping below it and being 'forgotten,' before it is well established as part of the subject's knowledge. Movement across the threshold of conscious knowledge is here indicated in gradual and irregular shortening of the reaction times. The threshold is actually crossed where the response is anticipatory, coming before the stimulus is perceived.
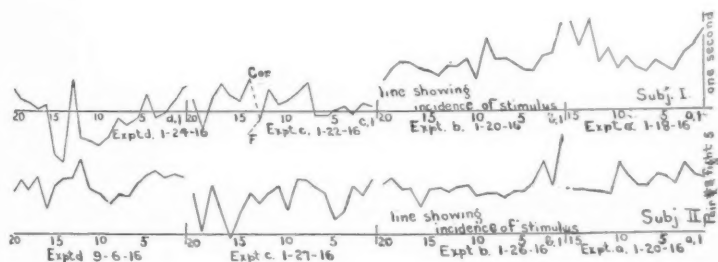
TABLE VI

Subject I

Pair	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Median
1. Number of card presentations up to and including first positive and correct verbal response	3	5	3	5	5	6	3	6	7	2	7	2	7	8	2	2	2	7	5	2	4.0
2. Number of verbal responses not correct (including both false and negative responses)	3	4	2	4	2	4	3	5	6	1	6	6	6	7	2	1	1	4	3	2	3.5
3. Whole number of anticipatory responses	44	29	39	45	55	43	48	14	24	16	13	0	3	2	18	34	27	8	33	22	25.5
4. Round containing first anticipatory response	7a	10a	8b	8b	4a	4b	4a	3c	7a	10b	7c	0	3d	12d	20b	4b	8b	2d	8a	5b	…
5. Round adjacent to first positive and correct verbal response	15a	10b	15a	10b	10b	20b	15a	20b	1c	10a	1c	10a	1c	10c	10a	10a	10a	1c	10b	10a	…

Subject II

Pair	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Median
1. Number of card presentations up to and including first positive and correct verbal response	6	6	9	5	2	2	4	9	5	3	4	6	3	5	6	2	8	5	2	2	5.0
2. Number of verbal responses not correct (including both false and negative responses)	8	10	5	6	1	2	7	11	10	4	4	7	3	11	6	2	9	9	1	3	6.0
3. Whole number of anticipatory responses	6	21	0	1	17	1	12	1	0	0	3	0	5	0	2	17	0	0	1	20	1.0
4. Round containing first anticipatory response	9b	9b	0	20c	12b	18d	12c	16c	0	0	5c	0	16b	0	12c	12b	0	0	17c	4b	…
5. Round adjacent to first positive and correct verbal response	20b	20b	20c	10b	10a	10a	1b	20c	10b	15a	1b	20b	15a	10b	20b	10c	10c	10b	10a	10a	…

75. The accompanying profiles illustrate this gradual and irregular shortening of reaction time through successive rounds of the kymograph. At the beginning, the subject did not know the number attaching to the word.

76. Attention is invited to records of individual stimuli, with reference (1) to the selective character of the learning process, (2) to the relation of the learning shown by verbal and by key responses. Information is offered in the accompanying table. (See p. 386.)

77. Responses at the ends of memory series are expected to be learned more readily than those in the middle. This partly but not generally characterizes the present material. Memory for verbal responses appears receptive to certain pairs as such; Subject I., pairs 10, 15, 16, 17; Subject II., pairs 5, 6, 16, 19, 20. It appears refractory to other pairs such as in Subject I., pairs 9, 13, 14, 18; Subject II., pairs 8, 9, 14. (Table VI., items 1 and 2.)

78. The most anticipatory responses are shown by Subject I. in pairs 5, 7, 1, 6; by Subject II. in pairs 2, 20, 5, 16. Fewest are shown by Subject I. in pairs 12, 13, 14, 18; seven pairs have no anticipatory responses by Subject II. (Item 3).

79. Above indicated lack of parallelism between memory for verbal responses and memory for key responses is further evident (Items 4 and 5). Pairs are quickly learned to anticipatory key response but correct verbal response is not assured at the next trial or until some trials later; Subject I., pairs 2, 5, 6, 9, 19; Subject II., pairs 1, 2. Again and more frequently, correct verbal responses are not associated with anticipatory key responses until somewhat later in the experiment. (But many responses not so listed are virtually anticipatory, since though not occurring before full exposure of stimulus, they occur less than true reaction time after such exposure. See profiles.)

80. Following observations are also pertinent to the above. In Subject I.: pair 6, though well known verbally at and after 20b, elicits but two anticipatory reactions during the first ten exposures of experiments c and d (at 9c and 8d respectively). In pair 15, verbal response fails at 20b, though

the key response at 20b is anticipatory. In Subject II.:
pair 1, between two false verbal responses at 1b and 10b,
anticipatory key response occurs at 9b. Pair 2, anticipatory
responses occur at 9b, at 2c, 5c, 6c, 7c, 8c, and at 15d, with
negative or false verbal responses both preceding and follow-
ing them. Pair 7, at 20d, a false verbal response is given
after three correct verbal responses preceding, and after 5
anticipatory key responses in the preceding ten rounds. On
the other hand in pair 8, the sole correct verbal response
given falls at 20c, after the sole anticipatory key response at
16c. (See plate, paragraph 75.)

81. Knowledge both for verbal responses and for anticipa-
tory key responses fluctuates above and below the conscious
threshold where it becomes effective for volition. When
knowledge for verbal response is below the threshold of
consciousness, negative or false responses are produced.
When but slightly above it, doubtful responses are produced.
When knowledge for key responses is below the threshold of
consciousness, response requires true reaction time after
exposure of the stimulus. As this threshold is approached and
crossed, this time is shortened to anticipation. The conscious
is continuous with the unconscious, the threshold an imagi-
nary line.

82. It is not unreasonable to infer that all gains and
losses of knowledge represented in these observations, are
fluctuations of a completely associated knowledge of verbal
response and of key response, which at any given time is
equally effective for both. This cannot be checked, as verbal
response and key response cannot be measured at the same
moment without associating them irrelevantly to the purpose.
The indication is of two partly dissociated sorts of knowledge,
each capable of moving at different rates and in different
directions, with reference to the conscious threshold.

CHANGES OF APPRECIATION FOR COLOR COMBINATIONS

BY STEPHEN C. PEPPER

The present experiment[1] was prompted by some cases that have come under my observation of evident change in the appreciative attitude of certain persons towards colors and color combinations. Artists who in the schools could admire only combinations of unsaturated colors, have so changed in their attitude that now they admire not only combinations of saturated colors but combinations of saturated colors at short intervals apart, combinations which they would have abhorred in their younger days. That changes in persons' appreciative attitude towards musical harmonies takes place is a well-established historical fact that has received experimental confirmation through the investigations of H. T. Moore.[2] I wished if possible to find experimental confirmation for the changes I had observed in persons' appreciative attitude towards color combinations. I resolved, therefore, to stimulate subjects repeatedly with combinations of colors in an attempt to produce experimentally such changes.

METHOD

The experiment was carried on in a dark room. The subject sat on a stool in the dark room facing a window which was covered with a black shutter. On the other side of the shutter, so arranged that it was the only object visible to the subject when the shutter was raised, was a light gray cardboard two feet square tipped at an angle of approximately 45° and illuminated by a daylight lamp swung overhead. In the middle of the cardboard an opening 3½ in. square was cut, behind which slides of colors could be slipped.

[1] Conducted in the Harvard Psychological Laboratory under the direction of Prof. H. S. Langfeld.

[2] Moore, Henry Thomas: 'The Genetic Aspects of Consonance and Dissonance,' PSYCH. MONOG., No. 73, Sept., 1914.

The Bradley colors were used in the saturated hues, violet, red-violet, violet-red, and red, with a tint and a shade of each hue—twelve colors in all. The choice of violets and reds was the result of a hasty preliminary examination of my subjects in all the hues, which seemed to indicate a greater dislike for combinations of reds and violets than for those of any other narrow range.

Part One

The first part of the experiment had for its purpose the determination of the subjects' average consistency in judgments of color appreciation, and the establishment of a basis for the choice of combinations to be used in the second portion of the experiment.

This double purpose was served by causing the subjects to give two judgments for each combination of colors within the range chosen. Since there were 66 possible combinations within the range selected, each subject gave 132 judgments in the first part of the experiment. Two slides were slipped behind the opening in the cardboard and placed side by side, so that half of each color showed, one to the right and one to the left. There was no interval between the slides; the edge of one slide abutted the edge of the other. To avoid the space error, the position of the colors in combination were exchanged when presented a second time. And by setting the colors side by side, not one above another, the effect of apparent weights of colors was minimized (though even as it was some subjects were disturbed by this factor).

After entering the dark room, the subject was allowed about five minutes to become dark adapted before the colors were shown; and then was given the following instructions: "Grade the combinations of colors you see in accordance with your liking of them, A+ being highest, E− lowest, and C neutral. Do not compare combinations with one another, and make your judgment of the *combination* of the colors, not of the colors separately." The last phrase was inserted to focus the attention on the combination. Frequently subjects found they could make two distinct judgments which would vary greatly, the one upon the general impression the colors

produced, the other on their suitability for combination. Since it was the combination we were interested in, the former type of judgment was systematically rejected.

After these instructions were given, the shutter was raised and the colors were exposed for five seconds. Then the shutter was lowered and the subject gave his judgment. When a minute had elapsed (affording time for after-images to lose their intensity), another combination was exposed. And so on at the rate of a little less than a combination a minute. As many judgments were recorded as could be made in the course of an hour. No regular method of determining the order of combinations to be exposed was observed. The combinations were selected at random, effort being made only to avoid showing the same combination twice in close succession.

When all the judgments had been made, the average consistency of each subject was estimated and may be seen in the third column of the table. In these averages a unit means a grade, or the difference between B— and B. The average consistency of the subject was estimated as follows: As stated, each subject gave two judgments on each of the 66 combinations. These pairs of judgments were compared and the amount of deviation between them set down. Thus if a subject's first judgment on a combination were D+ and his second C, there would be a deviation of two points. These deviations were all set down and then added up. The total sum of deviations was then divided by 66, the number of combinations observed, and this gave the average deviation for a combination, or the subject's average consistency.

Also the general average judgment for all the combinations was estimated and may be seen in the second column of the table. The general average of a subject was obtained by reducing the letters representing his judgments to figures. Thus $A+ = 1$, $A = 2$, $A - = 3$, $B + = 4$, and so on. Each judgment would in this way be represented by a number. The numbers representing all the judgments of a subject were added together, and this sum divided by the total

number of judgments given. The number so obtained would be the number of the subject's average judgment. This number was interpreted into its corresponding letter (*e. g.*, if it were 4, it would be interpreted as B +) and this letter would be the average grade of the subject.

In all cases but one, namely subject No. 2, the subjects were kept in ignorance of the purpose of the experiment.

Part Two

From all the combinations six were chosen for each subject to constitute the basis of experimentation in the second portion of the experiment. Whenever possible three of these combinations were D's, one an A, one an E, and one a B or a C. In all cases but one, three D's were obtainable, but in that one case (subject No. 1) there actually were no D judgments given. These selected combinations were then presented to the subject in the same manner as before. But the instructions were changed as follows: "Combinations of colors will be shown to you as before. But now as far as possible inhibit all judgments about them. Simply look at them as long as they are presented to the eye."

After four weeks the subjects' judgments on the combinations with which they had been stimulated were checked up. Since it was desirable the subject should not remember from time to time the judgments he had previously given on a combination, and also that he should make the judgments on the selected combinations as naturally as possible, the six selected combinations were distributed at random in a group of fifteen or twenty other combinations. All of these combinations were then exposed before the subject one after the other exactly as in the first part of the experiment. And the subject was given at the first of the hour the same instructions as in the first part of the experiment.

The new judgments for the selected combinations were recorded and compared with the old ones. In this manner the experiment was continued until the end of the year—four hours of exposure without judgment, then a checking up, again four hours of exposure, and again a checking up.

RESULTS

More than a third of the judgments showed a change of appreciation at the end of the experiment over the beginning exceeding the average consistency of the subject, this change on the whole being toward neutrality. The total number of points gained or lost for each grade was as follows: The total gain for E's was 9; loss 0; for D's 21, loss 9; for C's 1, loss 3; for B's 2, loss 20; for A's 0, loss 13. While there is some evidence of a change in individual æsthetic judgments, the results are not sufficient to warrant a definite conclusion or more detailed analysis.

The experiment, however, brought out some other results of a more definite character. Chief among these is a movement of the *average* of æsthetic judgments (in contrast with a movement of individual judgments). The evidence for this movement is based on a comparison of the average judgments of the subjects considered in relation to their individual experience in color observation. The subjects fell naturally into two classes on the basis of their color experience—an experienced class and an inexperienced. The experienced class comprised an artist (subject No. 1), an æsthetician (subject No. 2), and an experienced layman (subject No. 3) who had somewhat more than average interest and experience in colors. Of these the artist had most experience with colors, the æsthetician next, and the experienced layman next. The other four subjects comprised the group of inexperienced subjects and so far as could be ascertained at the beginning of the experiment they were of about an equal grade of inexperience. In view of these individual differences the average grades of the subjects for all the combinations used in the first part of the experiment are exceedingly illuminating. The average of all the combinations for the artist is B, for the æsthetician C, for the experienced layman C. For the rest of the subjects it ranged from C − to D (two C −'s, a D + and a D). No inexperienced subject had a grade as high as an experienced subject, and among the experienced subjects the artist who was the most experienced received the highest grade. In other words, the greater the experience of a

subject in color combinations the higher the average grade of appreciation. Upon continued stimulation with color combinations, a person's average æsthetic judgment for all combinations tends to be higher than before.

The same tendency may be seen from another point of view by examining the number of E's in the experienced group compared with that in the inexperienced group. No. 1 had no E's; No. 2 had five; No. 3 had four. These made up the experienced group totalling, nine E's with an average of three apiece. In the inexperienced group, No. 4 had five E's; No. 5, thirty-four; No. 6, twenty; and No. 7, seventeen— a total of seventy-six E's with an average of nineteen per person. The E's are evidently much scarcer for the experienced subjects.

It is noteworthy too that all the E's tested in the experienced group were raised: an $E+$ to a $D+$ in subject No. 2, and E to a $D-$ in subject No. 3, both raises being more than the average consistency of the subjects. On the other hand, in the inexperienced group out of four E's tested two remained unchanged, one was raised slightly but not above the average consistency of the subject, and only one showed an unmistakable raise. The E level was in unstable equilibrium for subjects No. 2 and No. 3, while it was still firmly established in subjects Nos. 4, 5, 6, and 7.

If these facts indicate a law, then with experience the average grade of a subject should tend to go above neutral C. If the æsthetician and experienced layman had had more experience with colors, there is every reason to believe they would have averaged higher than a C.

The fact that they averaged a C in the particular range of color combinations experimented upon is evidence that they would have averaged considerably above a C in their appreciation of all color combinations. For it must be borne in mind that the particular range of color combinations chosen was selected because in a rough preliminary investigation that range seemed to be the one in the whole gamut of colors most disliked. Hence, if the experienced subjects averaged a C in this narrow range of color combinations, they would

have averaged above a C for all color combinations. It is evident, therefore, that experience in colors not only tends to raise the average appreciation of a subject, but to raise it above neutral C.

To avoid misunderstanding it must be emphasized that repeated stimulation is not the only factor operative in determining judgments of appreciation. A person's character, state of health, or condition of rest or fatigue, all have their influence on the æsthetic judgment, but above all association. A color associated with a violently unpleasant experience will carry the shadow of that unpleasantness into every combination into which it enters. The same is true of associations with pleasant experiences. A certain combination used in the first part of the experiment happened to be the colors of one of the subject's college fraternity. It was quite impossible for him to take a disinterested attitude towards the colors, so that his judgment on that combination was valueless. The effect of association, however, seemed to be minimized in this experiment by the range of colors that was chosen. The violets and reds are not so common in nature, dress, and decoration as most other colors, and consequently the experiment was not so much disturbed by association as would have been expected. It also appeared that the experienced subjects were less disturbed by associations than the inexperienced, as might have been foreseen since experienced subjects have noticed colors so often that whatever associations might once have formed about them would afterwards become blurred and neutralized, while inexperienced subjects notice colors so rarely that when once a color is noticed the whole context in which it appeared is likely to be recalled when next the color is seen.

A subsidiary point of some interest brought out in the course of the experiment was that the greater the subject's experience with colors the higher was his average consistency or assurance of judgment. All in the experienced group had an average consistency of less than 2, and in about the order of their experience. Subject No. 1 who had the greatest experience had a higher consistency than No. 3 who was less

experienced. Though subject No. 2 was less experienced than No. 1, that subject's exceptionally high consistency may be attributed to long introspective training, since he was a trained psychologist. All the inexperienced subjects except No. 4 had an average consistency of 2 or more. No. 4's average consistency was 1.8, which though high was not so high as the lowest of the experienced subjects. No. 4, it may be recalled, is the subject who had the small number of E judgments among the inexperienced subjects.

Summary of Results

I. The average of æsthetic judgments of color combinations
    (*a*) is higher for experienced than for inexperienced
        subjects,
    (*b*) has a tendency to rise above neutral C.
II. The influence of association on æsthetic judgments of color combinations is less prominent in experienced than in inexperienced subjects.
III. The average consistency of æsthetic judgments of color combinations is higher in experienced than in inexperienced subjects.

Table

Subject	Average Grade	Average Consistency
No. 1	B	1.5
No. 2	C	1.2
No. 3	C	1.7
No. 4	D+	1.8
No. 5	D	2.0
No. 6	C−	2.6
No. 7	C−	2.6

PATIENCE WORTH

BY CHARLES E. CORY

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The reader has probably had his attention called by the press to the writings of the author known as Patience Worth, and to the discussion that has arisen concerning them. During the past two years it has been possible for me to study the phenomenon at close range. Some of its features are of interest to psychology.

It should be said at once that the case is one upon which no satisfactory report can be made without the aid of hypnosis. Anything like a real explanation of the problems to be solved requires data that can be obtained in no other way. These problems are, as will be seen, (1) subconscious memory and perception, (2) subconscious thought. Without hypnosis these problems lie largely in obscurity. Hypnosis has been refused because of a fear that it might injure or destroy the ability to write, and not, I believe, through a desire to avoid a thorough investigation. It has seemed, however, worth while to report the case, and to show what the problems really are in the light of facts that have been verified. To this general statement I shall add, at the close, some reflections of a tentative character.

In describing the case it will make for clearness if the reader will understand that Patience Worth, the writer, is a subconscious personality of Mrs. John Curran, of St. Louis. About five years ago Mrs. Curran began to write, automatically, literature of an unusual character. Since that time novels, plays, and poems have appeared. Over fifteen hundred poems have been written. Two of the novels, 'The Sorry Tale' and 'Hope Trueblood,' have been published by Henry Holt & Co. Four additional novels are in various stages of completion. Most of this literature is conceded by critics to be of a very high order. No two of the larger works

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are written in the same English.   They range from a very
old English to one that is in nearly all respects modern.
The New York Sun said of 'Hope Trueblood': "It is a story
that George Elliot might not have been ashamed to own up
to."   Of the 'Sorry Tale,' *The New York Times* in reviewing
it, said: "The long intimate tale is constructed with the pre-
cision and accuracy of a master hand.   It is a wonderful,
a beautiful, and a noble book."   And from the *Boston
Transcript's* review of the same book I quote: "The thoughtful
reader will marvel at its beauty, its poetry, its power.   The
impression is that it is the work of a literary artist."   Mr.
Reedy, the editor of *The Mirror*, and a distinguished critic,
says of it: "This is the most remarkable piece of literature I
have ever read.   I have no hesitation in saying that this
production (I ignore any religious claim for it, and I discount
that adventitious interest in the manner of its appearance)
is a world literary marvel."

Mrs. Curran is a woman thirty-five years of age.   Her
education did not extend beyond the grammar school.   Her
general reading has been meager and desultory.   She has
not been abroad, and has travelled but little in America.
She has no experience or practice in writing, and never en-
tertained any aspiration to authorship.   The one ambition
of her life has been to sing.   She has a good voice, and until
Patience Worth 'arrived,' her entire energy was given to
its cultivation.   No one could be more surprised and mysti-
fied by what has taken place than Mrs. Curran.   It should
not be inferred that Mrs.   Curran is an unintelligent woman.
On the contrary, she is very intelligent.   Her quick intuitive
understanding is recognized by all who know her well.   A
conversation with her, however, though based upon an ex-
tended acquaintance, does not give the impression that one
is in the presence of the mind that wrote 'The Sorry Tale.'
And so foreign to her entire life do Patience Worth and her
writings seem, that both she and Mr. Curran have, from the
beginning, looked upon her as a disembodied spirit.   Toward
her they hold an attitude of awe and reverence.

Before writing, Mrs. Curran appears to have no intima-

tion of what is coming. She shares with those present complete ignorance on this point. It may be one of several novels, poetry, or general discourse. Without delay the writing proceeds, and with a speed that frequently outstrips that of the most expert longhand writer. In the most difficult part of a novel she has written as high as five thousand words in an evening. The composition is final. A complete record has been kept of all that has been written. These records, running back to the first manifestations, afford a good outer history of the case. Aside from the literary output, the discussions and conversations fill many volumes.

A thing that gives special interest to this literature is that most of it reflects the life and manners of other times, and this it does with an intimacy that astonishes the reader. They presuppose upon the part of the author, a wealth of information, a richness of contact that is normally secured only through a prolonged study. 'The Sorry Tale' is a large and intricately woven novel dealing with Jewish and Roman life at the beginning of our era, involving an enormous mass of knowledge of the life and customs of that time. It is a powerful drama, full of subtle humor and seasoned wisdom. 'Telka,' an unpublished poem of seventy thousand words, has an English background. The language used is unlike that of her other works. It is an archaic English of different periods, and various localities. It is difficult to understand how it could be used as a medium of poetry by a modern writer. And the source of this language is a part of the general problem. 'Hope Trueblood' has an English setting of the early mid-nineteenth century. 'The Merry Tale' goes back to the days of the cross-bow. It is a humorous tale of rough tavern life. The language is not modern, and the general reader would find it difficult. Only a reading of the million and a half words that have been written can give an adequate idea of the great reservoir of knowledge that is accessible to this secondary personality. A careful survey of Mrs. Curran's reading from childhood leaves the problem of its source largely unsolved. What she may have heard, or rather, what may have been said in her presence, is another

matter, and, obviously, a far more difficult thing to determine. But a knowledge of the interests that have dominated her life forces the conclusion that most of this material did not pass into her mind through the channel of her conscious attention. What her total environment has been, and just how that environment has been appropriated, is the question. And the problem is complicated by the fact that there have been two selves, that is, two centers of apperception drawing upon that environment. Hence no history of Mrs. Curran in terms of an ordinary biography could hope to solve the problem. Not one, but two histories must be traced. So far only one has been followed. And its value, in view of the probability that the dissociation is of long standing, is, and could be, only indirect. It only defines the problem, marking off the residue to be explained by processes which did not enter her consciousness. And there is in the material thus left, much that is significant for the study of subconscious perception and memory.

But even more significant, it seems to me, is the bearing which the case has upon the problem of subconscious reflection processes, or those that are commonly so called. It offers a new answer to the question that is of growing interest, namely: What degree of rationality may the processes of a subconscious center attain? Here there is a product showing a mentality of a very high order. It is original, creative, possessing a delicate sense of beauty, a hardy rationality, and, above all, and perhaps most surprising, a moral and spiritual elevation. Patience Worth easily meets most tests that are applied to the normal personal consciousness. In conversation she displays a quickness of insight, a readiness of repartee that enables her to hold her own in the company of the learned. Mrs. Curran is an intelligent woman, but her mind is much inferior to that of Patience Worth. In short, here is a subconscious self far outstripping in power and range the primary consciousness. This is an indisputable fact, and it is a significant one for psychology. In some way the dissociation has resulted in the formation of a self with greatly increased caliber. It has not only given it access to

a much wider range of material, but it has given it a facile creative power amounting to genius. It is hard to give an adequate impression of the versatility of this mind. Intricate composition proceeds with astonishing ease. During an evening she may write alternately upon several novels, passing from one to the other without a moment's pause. And this work is accomplished without the aid of manuscripts. While writing Mrs. Curran does not have before her the finished portions of these works. A novel untouched for weeks or months will be resumed at just the point where it was broken off.

When writing, Mrs. Curran goes into no trance. In other words, the primary self is not displaced, or it would be more accurate to say that the modification that occurs does not amount to an alternation of personality. To the casual observer no change is noted. There is, however, some abstraction. This is more pronounced than it was formerly. When the writing began, it was read from the board; an ouidja is used, in the usual manner. But years of practice have made it possible to write with only an occasional reference to the printed letters. A general movement of the hand is now sufficient to throw the letters into the consciousness of Mrs. Curran, and these are rapidly spoken as they appear. Not only do the letters appear but the entire panorama of the story seems to move before her, like pictures on a screen. Within the field of the primary consciousness there is a smaller field, and within this field the characters of the novels act their rôles and are seen as vividly as on a stage. Apparently the only effort required on the part of Mrs. Curran is that involved in passivity. With the proper abstraction she receives from the secondary self the letters and imagery. The meaning of what is written is, naturally enough, frequently not understood by her. Neither its form nor its substance is determined by her consciousness. They are apparently the creation of a self whose existence she is, for the most part, completely unaware of. And this self is no mere by-product of a more fully developed mind. Patience Worth is a personality of tremendous creative energy. And unlike most dissociated personalities she is morally sound.

Is there not here, then, material for a new answer as to
what a subconscious mind is capable of doing?   But one may
ask, is this mind really submerged when it does this creative
work?   In other words, may it not all be done at the time
of writing when Mrs. Curran's abstraction permits a slight
emergence above the threshhold?   And is not this approach
to the surface a condition of lucidity?   A brief study of the
case will eliminate that possibility.   It is true that some of
the poems are thought out as they are written, that is, they
are improvised at the time of writing.   And the actual com-
position of the larger works probably receives at that time its
final form.   But it is inconceivable that these elaborate and
intricately wrought novels should not have been planned
before they are so hastily written.   And that they are the
work of previous thought is confirmed by Patience Worth's
own statement.   This means that while Mrs. Curran goes
about the cares of her household, the other self, unknown to
her, may be deep in an English novel.   The selves, to repeat,
are not alternating but coexistent or co-conscious.   Such
co-conscious phenomena are now familiar enough to psychol-
ogy.   That which is peculiar to this case is the quality of the
mentality of the secondary self.   The passage from the pri-
mary to the secondary self is not one into a twilight zone or
semi-darkness.   On the contrary, there is met a mind of a
higher order, a mind of decidedly greater power.   And of
the activity of this self, aside from the slight contact while
writing, Mrs. Curran has no knowledge.   There is evidence,
however, that the secondary consciousness includes much,
or possibly all, of the field of the primary consciousness.   That
is, while Mrs. Curran has no knowledge of Patience Worth,
the latter is probably aware, in a way, of all that the former
experiences, or may at any time become so.

It is evident that the term subconscious is misleading
when used to describe the source of this literature.   As
generally used it would imply that these works are the product
of marginal or submarginal tendencies.   This they are, only
with reference to the other field.   With reference to the self
that created them, they are distinctly within the conscious.

The term co-conscious, as used by Prince to describe some-
what similar cases, is helpful here. At all events, and this
is the significant thing, these delicate and finely rational
processes, these highly elaborate compositions, are performed
apparently without the aid or knowledge of Mrs. Curran.
Just how these works are composed, and just what the sources
for much of the material are, this report has little that is
definite to give. It is chiefly interested in attesting to the
above facts.

Some reflections, however, have occurred to me in review-
ing the case. I accept the judgment that Patience Worth is a
genius of no mean order. And, perhaps, there is in the genius
of this writer a concrete illustration of what freedom a mind
may achieve when released from the inhibitions that clog
and check the normal consciousness. She is a dissociated
self, and this dissociation has taken place in such a way as
to free her from the burdens and concerns of life, from all the
claims that split the will and bind the fancy. And perhaps
in this fact, and all that it implies, lies the condition of her
genius. The division of the self has resulted in a division
of labor. To Mrs. Curran falls the care of the needs of the
body, and the interests of the social life. Their reactions
and distractions are hers. From all this Patience Worth is
free. Between her and the entire active phase of life stands
the buffer consciousness of Mrs. Curran. In aloofness and
abstraction she dwells. She is beyond the reach of perturba-
tion and confusion, and therein lies her strength. Her mind
seems to possess the effortless activity, and facility of a
dream, a dream without chaos. The normal consciousness is
forced constantly to divide its attention between the world of
idea and the world of action. The imminence of action is
never far removed. Consequently its moments of abstrac-
tion or thought are brief and fitful, sustained with effort
against the solicitation and lure of sense. The organism
requires constant orientation. This holds the attention and
divides the energy. It is well that the imagination, in normal
life, is weighted and somewhat inert. Action and its world
have their claims, and these are, as they should be, strong.

But unless they are to some degree inhibited they tend to absorb consciousness. Fancy is crowded out or sustained with effort. Irrelevant it perishes.

But turn to this dissociated mind and the conditions have changed. The work of adjusting the organism to the environment being left to the other self, the inhibitions which perception places upon the imagination are removed. This sets free and unfettered the mind of Patience Worth. In the realm of the idea she lives, and there she sustains herself without effort. She acknowledges no tie or bond that might take her out of her dream. She is a dreamer that never awakens. And the conditions of this spell are, in a way, the condition of her genius. With her our moments of abstraction, moments that life affords us the luxury of thought and imagination, are prolonged indefinitely. They are, in fact, a fixed condition. In other words, she lives only in a world of thought. And so far she has shown no desire to displace the other self, and alternate with her in the rôle of action. To do so would result in essential modification of her consciousness, and put her under inhibitions from which she is now free.

It is clear that we are here dealing with a mind so constructed as to open up most interesting possibilities. Structurally, the type is so novel that it is hard to imagine either its range or its limitations. Its actual behavior is instructive from every angle, whether it be from that of memory, feeling or thought. In regard to all of these, interesting modifications of normal experience are observable. It is difficult to give an adequate impression of her composition, its ease and rapidity, and no less impressive are her feats of memory, such as reproducing immediately, upon request, an early chapter of 'The Sorry Tale' which had been mislaid, months having elapsed since the time of its writing.

A reference has been made to dreams. While surely very unlike dreams in most respects, there are, I believe, some points of resemblance. Some things are done that would suggest that in a mind of this type the processes have a tempo not normal, probably much accelerated. And since, as in

dreams, this mind is not correlated with action its tempo may resemble more that of dreams than that of normal life. Something like this I know to be definitely affirmed in a case of alternating personalities, that is, one of the selves insists that upon taking control or possession of the body she experiences a noticeable restriction and loss of freedom in her thought. The structural changes involved in such forms of dissociation would provide the explanation for these accounts, should they prove to be statements of fact.

The point in question is one upon which all available data should be brought to bear. The idea would admit significant alterations of normal experience. Processes of mediation, normally requiring considerable time, might approximate immediacy, as seems to be the case in certain dreams, when a highly complex experience presents within itself directly its meaning. Some of the performances of Patience Worth would suggest that she may have some advantage over the normal consciousness in this regard. Such a supposition would also throw some light on her power of orientation, as illustrated in her shifting without pause from one novel to another. In doing this she changes periods of history, and passes at once into another world of feeling and action, and clothes it in a different style and language. As in dreams the appropriate mood and background follows quickly any idea, unchecked by the stability of outward circumstances. Within the mind itself, however, all seems under a nice control.

I have spoken of the rationality and sanity of this strange author. This is the impression of hundreds that have talked to her. And I believe there are few writers that get nearer to the heart of human life. But one need not concede that she is a great genius in order to see the problems involved, and their interest to psychology. I have briefly sketched what they appear to me to be. At another time I hope to make more detailed statement of the case.

One more thing should be mentioned. The assertion was just made that Patience Worth was highly rational, sane. Upon one subject, however, this mind is under an illusion. It is well known that she insists that she is the discarnate

spirit of an English woman who lived in an age now long since passed. She not only insists upon it but she argues her claim at length, and with cleverness. And, to my mind, it is doubtful whether the S. P. R. has on hand better "evidence." That she is honest in this belief there is no reason to doubt. The full history of this illusion, this idea that she is a returned spirit, can be secured only by psycho-analysis. But it is worth noting that Patience Worth made her appearance after Mrs. Curran had spent many evenings with a friend, a confirmed spiritualist, with a view of getting a message from the spirit world. In the atmosphere of expectancy, of hope that a voice from the dead might be heard, she may be said to have been born, and it is more than possible that the idea became, at that time, a vital part of the dissociated self then developing. Thus in this self is found just that idea that would sever it most completely from the dominant personality of Mrs. Curran. This idea, although having, I believe, nothing to do with the real cause of the disintegration, has helped shape and mould her character. What is more she has lived in the atmosphere of the idea ever since the day of her appearance, those about her acting their part in sustaining the illusion. This chapter of the story is too large for this context, but it is an interesting one.

And there is a sense in which her claim to be a disembodied spirit is correct. A self incarnate is generally understood to be a self correlated with, and interested in, the biological needs of the organism, a self articulated with the perceptual and functional life of the body. Its life includes action and conduct. Patience Worth is not embodied in this sense. Back in the recesses of the subconscious she was born. Created in an ideal world, conceived in fancy, she has fashioned herself out of the stuff of the imagination, and there she remains, admitting no interests that would contradict the illusion. Such she believes and understands herself to be, an English spinster of long ago.

But the thing that interests her most is not her own personality, but the religious and spiritual truth that she presents in her poetry and fiction. And in reading these

works, one will find no trace of abnormal tendencies, such as
are clearly marked in much of the poetry and painting of
Blake, whose experience was in many ways analogous to the
case here described. Patience Worth is blessed with an
abundance of fine and wholesome humor. And her poetry
reflects a mind acquainted with the out of doors, one that
has had an intimate contact with the life and moods of na-
ture. These things are mentioned here because they go
to make up one's feeling of her general sanity, her mental
poise.

But it is to 'The Sorry Tale' that one must go to get the
dimensions of her mind, its moral security, and dramatic
power. And yet this mind that has plumbed so deeply human
experience, and has touched with a sure hand its greatest
tragedy, is a mind that is in error regarding its own origin
and history. "Many moons ago I lived," she repeats,
"Patience Worth my name." And concerning my effort to
explain her, she recently made the following comment:

> I am molten silver, running.
> Let man catch me within his cup.
> Let him proceed upon his labor,
> Smithing upon me.
> Let him with cunning smite
> My substance. Let him at his dream,
> Lending my stuff unto its creation.
> It shall be none the less me.